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PART II

WATER RESOURCES COUNCIL

Proposed Principles and Standards for Planning Water and Related Land Resources

■

Notice of Public Review and Hearing

WATER RESOURCES COUNCIL

PROPOSED PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES

Notice of Public Review and Hearing

1. *Time and place.* Notice is hereby given by the Water Resources Council of a period of public review and comment commencing as of the date of this publication and terminating March 31, 1972. As part of this review, a public hearing will be held at the National Museum of History and Technology, 14th Street and Constitution Avenue NW., Washington, D.C., on March 20 and 21, 1972, commencing each day at 10 a.m. (use Constitution Avenue entrance, Conference Room to left after entering).

2. *Purpose.* The purpose of this public review and hearing is to obtain, prior to formal Council recommendation for presidential approval, the views of the interested public on Principles and Standards proposed by the Water Resources Council, pursuant to the Water Resources Planning Act of 1965 (Public Law 89–80), for Federal participation with river basin commissions, States, and others in the preparation, formulation, evaluation, review, revision, and transmission to the Congress of plans for States, regions, and river basins; and for planning of Federal and certain federally assisted water and land resource programs and projects.

A separate draft environmental statement of the proposed Principles and Standards has been prepared pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969 (Public Law 91–190) and implementing guidelines, and the views of the interested public on it will be considered during the same period of public review and at the public hearing.

3. *Availability of proposal.* The texts of the proposed Principles and Standards and the draft environmental statement are published in this Part II, Volume 36, No. 245 of the FEDERAL REGISTER, as a part of this notice.

4. *Written statements.* Written views and comments will be introduced into the record if they are submitted to the Director, Water Resources Council, 2120 L Street NW., Washington, DC 20037, no later than March 31, 1972, or to the hearing officer at the public hearing. All statements should clearly indicate whether they are directed to the proposed Principles and Standards, to the separate draft environmental statement, or to both.

5. *Oral statements.* Views and comments may be presented at the hearing orally or by submitting a written statement for the record, as set out in paragraph 4 above. Notice of intention to present an oral statement should be provided to the Director, Water Resources Council, 2120 L Street NW., Washington, DC 20037, no later than March 6, 1972, with an advance copy of the statement if available. Such notice, as well as the statement itself, should clearly indicate whether it is directed to the proposed Principles and Standards, to the separate draft environmental statement, or to both. Persons providing such notice will be informed of the date and approximate time of their scheduled presentation at the earliest practicable date prior to the commencement of the hearing. The Council will attempt to schedule the presentation of those persons who fail to observe the March 6, 1972, deadline as time permits. If necessary to accommodate all those wishing to present oral statements, the hearing officer may limit such statements to 30 minutes. Any person so limited may submit a written extension of his remarks for incorporation into the record, provided he does so within the deadline set out in paragraph 4 above.

6. *Availability of record.* The record of views and comments received during the public review period, including a transcript of the hearing, will be maintained for public inspection at the headquarters of the Water Resources Council, 2120 L Street NW., Washington, DC 20037. Copies of the record, or portions thereof, will be furnished by the Council to any member of the public upon payment of the cost of reproducing the copies desired.

7. *Background of proposal.* These proposed Principles and Standards are based on over 2 years of intensive effort by the Water Resources Council.

The Council appointed a special task force to review evaluation practices currently used in planning. An initial public hearing was held in January 1969 to solicit public views. A preliminary report of the special task force proposing a multiobjective approach to planning water and land resources was published by the Council in June 1969. The Council directed that the issues and the proposals in the report be widely discussed and tested on existing projects.

Nine public hearings were held at which about 200 oral statements were presented and nearly 400 other statements were submitted for the record. The preliminary task force report, of which about 5,000 copies have been distributed, has been the subject of discussion at numerous meetings and seminars. The report has been extensively reviewed by several Federal agencies and river basins commissions. In addition, 19 field tests have been made of the proposed procedures based on the preliminary task force report. On the basis of this information and suggestions of numerous experts from Federal and State Governments, universities, and other sources the task force submitted its final recommendations to the Water Resources Council in August 1970.

After careful consideration, the Council has made certain revisions in the task force recommendations and has tentatively adopted the attached revised Principles and Standards, subject to public review and comment and presidential approval.

8. *Effect.* The Principles and Standards, when approved, will supersede the Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources, approved by the President, May 15, 1962, printed as Senate Document No. 97, 87th Congress, 2d session, together with Supplement No. 1 thereto, June 4, 1964, "Evaluation Standards for Primary Outdoor Recreation Benefits," and the amendment of December 24, 1968, 18 CFR § 704.39, "Discount Rate".

W. DON MAUGHAN,
Director,
Water Resources Council.

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PRINCIPLES, STANDARDS, AND PROCEDURES FOR WATER AND LAND RESOURCE PLANNING

The *Principles* provide the broad policy framework for planning activities and include the conceptual basis for planning.

The *Standards* provide for uniformity and consistency in comparing, measuring, and judging beneficial and adverse effects of alternative plans.

The *Procedures* provide more detailed methods for carrying out the various levels of planning activities, including the selection of objectives, the measurement of beneficial and adverse effects, and the comparison of alternative plans for action. Procedures are developed within the framework of Principles and the uniformity of Standards but will vary with the level of planning, the type of program, and the state-of-the-art of planning.

As indicated by these definitions, the concepts of Principles, Standards, and Procedures will evolve and change. Principles, reflecting major public policy and basic public investment theory, will change and evolve slowly. Standards, representing the best available techniques for the application of Principles, will change more frequently than Principles, as progress in the development of planning and evaluation techniques takes place. Procedures, detailed methods for the application of the Principles and Standards, will be subject to even more frequent revisions as experience, research, and planning conditions require such revision.

PROPOSED PRINCIPLES FOR PLANNING WATER AND LAND RESOURCES (DECEMBER 1971)

I. Purpose and scope.
II. Objectives.
III. Beneficial and adverse effects.
IV. General evaluation principles.
V. Plan formulation.
VI. System of accounts.
VII. Cost allocation, reimbursement, and cost sharing.
VIII. National program for Federal and federally assisted activities.
IX. Implementation of principles.

I. PURPOSE AND SCOPE

These Principles are established for planning the use of the water and related land (hereinafter referred to as water and land) resources of the United States to achieve objectives, determined cooperatively, through the coordinated actions of the Federal, State, and local governments; private enterprise and organizations; and individuals.

These Principles provide the basis for Federal participation with river basin commissions, States, and others in the preparation, formulation, evaluation, review, revision, and transmittal to the Congress of plans for States, regions, and river basins; and for planning of Federal and federally assisted water and land resources programs and projects and Federal licensing activities as listed in the Standards by the Water Resources Council.

Plans for the use of the Nation's water and land resources will be directed to improvement in the quality of life through contributions to the objectives of national economic development, environmental quality, and regional development. The beneficial and adverse effects on each of these objectives will be displayed in separate accounts with a fourth account for the beneficial and adverse effects on social factors. Planning for the use of water and land resources in terms of these multiobjects will aid in identifying alternative courses of action and will provide the type of information needed to improve the public decisionmaking process. The regional development objective will be used in formulating alternative plans only when directed.

II. OBJECTIVES

Existing or projected needs and problems expressed by the people through their local, State, regional, or national institutions have created a need for water and land resource management and use. These needs and problems are of such a multigovernmental nature that their resolution requires cooperation and coordination by many levels of government and private interests.

The overall purpose of water and land resource planning is to reflect society's preferences for attainment of the objectives defined below:

A. To enhance national economic development by increasing the value of the Nation's output of goods and services and improving national economic efficiency.

B. To enhance the quality of the environment by the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.

C. To enhance regional development through increases in a region's income; increases in employment; distribution of population within and among regions; improvements of the region's economic base and educational, cultural, and recreational opportunities; and enhancement of its environment and other specified components of regional development.

III. BENEFICIAL AND ADVERSE EFFECTS

For each alternative plan there will be a complete display or accounting of relevant beneficial and adverse effects.

Beneficial and adverse effects are measured in monetary terms for the national economic development objective and the regional income component of the regional development objective and for some social factors.

Other beneficial or adverse effects are measured in nonmonetary terms for components of the environmental quality, for the nonincome components of the regional development objective, and for most social factors. Estimating these beneficial and adverse effects is undertaken in order to measure the net changes with respect to particular objectives that are generated by alternative plans. For each alternative plan the beneficial and adverse effects on social factors will also be displayed in the system of accounts.

The measurement of the effects in itself, however, does not necessarily constitute an indication that such effects are beneficial or adverse. A decision on this question depends on the nature of preferences regarding each effect. One group may consider an effect beneficial while another group considers it adverse.

Effects on some objectives and components are generally regarded as favorable. These include, for example, gains in national output. For other objectives and components, however, preferences will differ. This will certainly be true of some of the components making up the environmental quality objective. For such instances, multiobjective planning provides information which should facilitate planning decisions and reduce conflict over such decisions.

Thus, there are beneficial and adverse effects for national economic development, environmental quality, and regional development objectives and beneficial and adverse effects on social factors. These are measured in quantitative units or qualitative terms appropriate to a particular effect. The multiobjectives are not mutually exclusive with respect to beneficial or adverse effects, and final decisions as to the selection of the recommended plan will be made by considering the differences among alternative plans as to all their effects.

A. BENEFICIAL EFFECTS ON NATIONAL ECONOMIC DEVELOPMENT

National economic development beneficial effects are increases in the value of the output of goods and services and improvements in national economic efficiency resulting from a plan. These include:

a. The value to users of increased outputs of goods and services; and

b. The value of output resulting from external economies.

B. ADVERSE EFFECTS ON NATIONAL ECONOMIC DEVELOPMENT

National economic development adverse effects of a plan include:

a. The value of resources required for a plan; and

b. Losses in output resulting from external diseconomies.

C. BENEFICIAL AND ADVERSE EFFECTS ON THE ENVIRONMENT

The beneficial and adverse effects of the proposed plan on the environmental characteristics of an area under study or elsewhere in the Nation will be evaluated. Environmental effects will be displayed in terms of relevant physical and ecological criteria or dimensions, including the appropriate qualitative aspects. Such an evaluation would include the effects of the proposed plan on:

a. Open and green space, wild and scenic rivers, lakes, beaches, shores, mountains and wilderness areas, estuaries, and other areas of natural beauty;

b. Archeological, historical, biological, and geological resources and selected ecological systems;

c. The quality of water, land, and air resources; and

d. Irreversible commitments of resources to future uses.

D. BENEFICIAL AND ADVERSE EFFECTS ON REGIONAL DEVELOPMENT

The following beneficial or adverse effects of the proposed plan on a system of relevant planning regions (States, river basins, or communities) will be displayed:

a. *Income effects*—(1) *Beneficial.* (i) The value of increased outputs of goods and services from a plan to the users residing in the region under consideration;

(ii) The value of output to users residing in the region under consideration resulting from external economies;

(iii) The value of output in the region under consideration resulting from the use of resources otherwise unemployed or underemployed; and

(iv) Additional net income accruing to the region under consideration from the construction or implementation of a plan and from other economic activities induced by operations of a plan.

(2) *Adverse.* (i) The value of resources contributed from within the region under consideration to achieve the outputs of a plan;

(ii) Payment through taxes, assessments, or reimbursement by the region under consideration for resources contributed to the plan from outside the region;

(iii) Losses in output resulting from external diseconomies to users residing in the region under consideration;

(iv) Loss of assistance payments from sources outside the region to otherwise unemployed or underemployed resources and displaced resources residing in the region under consideration;

(v) Losses in output in the region under consideration resulting from resources displaced and subsequently unemployed; and

(vi) Loss of net income in the region under consideration from other economic activities displaced by construction or operation of a plan.

b. *Beneficial and adverse effects on other components of the regional development objective.* (1) The number and types of jobs resulting from a plan in the region under consideration;

(2) Effects of the plan on population distribution within the region under consideration and among regions in the Nation;

(3) The effect of the plan on the economic base and economic stability of the region under consideration;

(4) The effect of the plan on educational, cultural, and recreational opportunities in the region under consideration;

(5) The effect of the plan on the environment in the region under consideration; and

(6) The effect of the plan on other specified components of regional development.

E. BENEFICIAL AND ADVERSE EFFECTS ON SOCIAL FACTORS

The beneficial and adverse effects of a proposed plan on social factors will be displayed, including:

a. *Real income distribution.* The effects of a plan on the real income of classes or groups that are relevant to the evaluation of a plan will be displayed. All effects, both monetary and income in kind, will be included in this display.

b. *Life, health, and safety.* Plan effects on life, health, and safety other than those evaluated monetarily for the national economic development objective will be included here. Measurement techniques will vary but would largely be in terms of physical units.

c. *Emergency preparedness.* The effects of the plan on reserve capacities and flexibilities in water resource systems and protection against interruption of the flow of essential goods and services at times of national disaster or critical need will be displayed.

d. *Other.* The effects on other social factors may be identified and displayed as relevant to alternative plans.

IV. General Evaluation Principles

A. GENERAL SETTING

Full employment will be assumed except where local areas of chronic unemployment, underemployment, or other conditions indicate otherwise. Plan formulation and evaluation will be based on national and regional projections of employment, output, and population and the amounts of goods and services that are likely to be required. Actual or projected needs for water and land resources will be related to these projections. Alternative plans will take into account established standards and goals for the quality of the environment and regional development.

B. MEASUREMENT OF BENEFICIAL AND ADVERSE EFFECTS

Beneficial and adverse effects of each alternative plan will be determined by comparing the conditions expected with the plan to the conditions expected without the plan. Since substantial changes may be expected even in the absence of the plan, care should be taken that this fact is properly reflected in plan formulation and evaluation.

C. PRICE RELATIONSHIPS

When prices are used in evaluation they should reflect the real exchange values expected to prevail over the period of analysis. For this purpose, relative price relationships and the general level of prices prevailing during the planning study will be assumed to hold generally for the future, except where specific studies and considerations indicate otherwise.

D. THE DISCOUNT OR INTEREST RATE

The discount rate will be established in accordance with the following concept: The opportunity cost of all Federal investment activities, including

water resource projects, is recognized to be the real rate of return on non-Federal investments. The best approximation to the conceptually correct rate is the average rate of return on private investment in physical assets, including all specific taxes on capital or the earnings of capital and excluding the rate of general inflation, weighted by the proportion of private investment in each major sector.

E. CONSIDERATION AND COMPARISON OF ALTERNATIVES

A range of possible alternatives to meet needs and problems, including types of measures and alternatives capable of application by various levels of government and by nongovernmental interests, should be studied. These alternatives should be evaluated or judged as to their contributions to the multiobjectives.

Plans, or increments thereto, will not be recommended for Federal development that, although they have beneficial effects on the multiobjectives, would physically or economically preclude alternative non-Federal plans which would likely be undertaken in the absence of the Federal plan and which would more effectively contribute to the multiobjectives when comparably evaluated according to these Principles.

F. PERIOD OF ANALYSIS

The period of analysis will be the lesser of (1) the period of time over which the plan can reasonably be expected to serve a useful purpose considering probable technological trends affecting various alternatives, or (2) the period of time when further discounting of beneficial and adverse effects will have no appreciable effects on design. Appropriate consideration will be given to long-term environmental and social factors which may extend beyond periods significant for analysis of national economic development or regional development beneficial and adverse effects.

G. SCHEDULING

Plans should be scheduled for implementation in relation to needs so that desired multiobjective beneficial effects are achieved efficiently. Beneficial and adverse effects occurring according to different patterns in time are affected differently by the discount process when plans are scheduled for implementation at alternative future times. Therefore, plan formulation should analyze the alternative schedules of implementation to identify the schedule that would result in the most desirable mix of contributions to the multiobjectives when the beneficial and adverse effects of a plan are appropriately discounted.

H. RISK AND UNCERTAINTY

Risk is characterized by a distribution of events occurring according to reasonably well-known probabilities, even though their sequence and time of occurrence cannot be determined. Frequency analysis in hydrology, where long records are available or can be mathematically simulated, is an example of predictable risk. In such situations, it may be necessary to choose between planning for average or probable conditions and planning for extreme events. When this is done, the nature of the choice and its relationship to the multiobjectives will be clearly stated. Predictable risk; based upon past experience, should not be divorced from predictable or foreseeable trends which would alter probabilities based solely upon previous experience.

Uncertainty is characterized by the absence of any known probability distribution of events. This is often the situation in water resources planning. The nature of uncertainty associated with the planning study, strategies proposed to deal with uncertainty, and their impact on the multiobjectives should be reported. In addition, sensitivity analysis may be employed to analyze uncertain situations.

I. SENSITIVITY ANALYSIS

Plans should be examined to determine their sensitivity to data availability and to alternative assumptions as to future economic, demographic, environmental, and technologic trends. Selected alternative projections and assumptions that are reasonably probable and that, if realized, would appreciably affect plan design or scheduling should be analyzed.

J. UPDATING PLANS

Because, of rapid change in social economic, environmental, technologic, physical, and other factors, a plan that is not implemented within a reasonable time after completion should be reviewed as provided in the Standards, to ascertain whether it continues to be the best alternative to achieve the multiobjectives.

V. PLAN FORMULATION

Plans will be directed to the improvement in the quality of life by meeting current and projected needs and problems as identified by the desires of people in such a manner that improved contributions are made to society's preferences for national economic development and environmental quality and where approved in advance for regional development. These plans should be formulated to reflect national, regional, State, and local needs or problems.

Multiobjective planning of water and land resources is a part of broader public and private planning to meet regional and local needs and to alleviate problems. Therefore, planning for water and land resources should be carefully related to other regional or local planning activities and should include active participation of all interests.

Plans for water and land resources will focus upon the specified components of the multiobjectives desired for the designated region, river basin, State, or local planning setting. These are expressed in terms of projected needs and problems identified in each planning setting.

The planning process includes the following major steps:

(1) Specify components of the multiobjectives relevant to the planning setting;

(2) Evaluate resource capabilities and expected conditions without any plan;

(3) Formulate alternative plans to achieve varying levels of contributions to the specified components of the multiobjectives;

(4) Analyze the differences among alternative plans which reflect different emphasis among the specified components of the multiobjectives;

(5) Review and reconsider, if necessary, the specified components for the planning setting and formulate additional alternative plans as appropriate; and

(6) Select a recommended plan based upon an evaluation of the trade offs among the various alternative plans.

A. SPECIFICATION OF COMPONENTS OF THE MULTIOBJECTIVES

At the outset and throughout the planning process, the responsible planning organization will consult appropriate Federal, regional, State, and local groups to ascertain the components of the multiobjectives that are significantly related to the use and management of the resources in the planning setting. These will be expressed in terms of needs and problems.

The objective and components selected for use in formulating alternative plans should be of concern to the Nation, and the objectives should be those that can reasonably be expected to be substantially influenced through the management and development alternatives available to the planner. The objectives for which plans are formulated can be expected to change over time and between areas of the Nation as preferences and possibilities change and differ. These changes will be reflected in the Water Resources Council's Standards.

The components of the regional development objective are to be considered explicitly in plan formulation in a particular planning activity only with advance approval.

The specified components will be defined so that meaningful alternative levels of achievement are identified. This will facilitate the formulation of alternative plans in cases where there may be technical, legislative, or administrative constraints to full achievement of objectives.

B. EVALUATION OF CONDITIONS WITHOUT A PLAN

The identification of the specified components of objectives will necessarily involve an appraisal of future economic, environmental, and social conditions expected without the plan as compared with those desired by people for the planning area. In addition, a sufficient inventory and appraisal of the water and land resource base of the planning area will be necessary.

C. FORMULATION OF ALTERNATIVE PLANS

The planning process involves an evaluation of alternative means, including both structural and nonstructural measures, to achieve desired objectives.

Based upon identified needs and problems, alternative plans will be prepared and evaluated in the context of their contributions to the multiobjectives. This involves comparisons among objectives, and it will be necessary to formulate alternative plans that reflect different relative emphasis among the objectives for the planning setting.

The number of alternative plans to be developed for each planning effort will depend upon complementarities or conflicts among specified components of the objectives, resource capabilities, technical possibilities, and the extent to which the design of additional alternative plans can be expected to contribute significantly to the choice of a recommended plan. Because planning staffs are limited, emphasis should be placed on examination of those waters and land-use plans which may have appreciable effects on objectives.

With respect to the number of alternative plans there will be a continuing dialog among the Water Resources Council, river basin commissions, and other planning groups, emphasizing on the one hand the need for national guidelines and overview of objectives for which alternative plans are formulated, and on the other the special insights into local planning situations that field level teams may develop.

Appropriate methods and techniques for estimating beneficial and adverse effects will be used to provide reliable estimates of the consequences and feasibility of each alternative plan.

In cases where the trade offs among objectives are judged to be significant in the context of either national priorities or more localized priorities, an alternative plan will be formulated to emphasize the contributions to each such objective. One such alternative plan will be formulated in which optimum contributions are made to the national economic development objective. Additionally, during the planning process at least one alternative plan will be formulated which emphasizes the contributions to the environmental quality objective. Other alternative plans reflecting significant trade offs among the national economic development and environmental quality objectives may be formulated so as not to overlook a best overall plan.

Alternative plans emphasizing contributions to specified components of the regional development objectives will be prepared only with advance approval.

Major increments proposed for addition to a plan intended to serve a single objective will be included only if the beneficial effects on that objective of the addition outweigh the adverse effects. For example, an increment to an alternative plan proposed for the national economic development objective would be added only if the additional beneficial effects exceeded the additional adverse effects, and similarly for all objectives. For plans emphasizing some combination of objectives, the incremental rule applies to the combination of objectives that is relevant.

D. ANALYSIS OF ALTERNATIVE PLANS

The display of beneficial and adverse effects for each alternative plan will be prepared so that the differences among alternatives can be clearly shown and accurately analyzed. The analysis will provide the rationale for the selection of a recommended plan and the underlying evaluation of the various alternative plans. This analysis will provide the information on which the planning organization and others can base judgments as to the most desirable mix of beneficial effects on objectives as compared with the adverse effects.

The trade offs among alternative plans should be displayed as fully as possible for the components of all objectives and for effects on social factors to facilitate administrative and legislative review and decision.

E. RECONSIDERATION OF SPECIFIED COMPONENTS OF THE MULTIOBJECTIVES

As planning proceeds, the specified components will be reviewed and reconsidered as appropriate. This reconsideration may result from new information, revised projections, changes in policy, or technological innovations. Reconsideration of components may result in modifying alternatives or developing additional alternative plans.

F. PLAN SELECTION

From its analysis of alternative plans, the planning organization will select a recommended plan. The plan selected will reflect the importance attached to different objectives and the extent to which different objectives can be achieved by carrying out the plan.

The recommended plan should be formulated so that beneficial and adverse effects toward objectives reflect, to the best of current understanding and knowledge, the priorities and preferences expressed by the public at all levels to be affected by the plan.

In addition to the recommended plan with supporting analysis, other significant alternative plans embodying different priorities among the desired objectives will be presented in the planning report. Included with the presentation of alternative plans will be an analysis of the trade offs among them. The trade offs will be set forth in explicit terms, including the basis for choosing the recommended plan from among the alternative plans.

VI. System of Accounts

A system of accounts will be established that displays beneficial and adverse effects of each plan to the multiobjectives and beneficial and adverse effects on social factors and provides a basis for comparing alternative plans. The display of beneficial and adverse effects will be prepared in such manner that the different levels of achievement to each objective can be readily discerned and compared, indicating the trade offs among alternative plans.

For purposes of accounting for the regional development objective, the system of accounts will display the beneficial and adverse effects in the region under consideration in relation to the other parts of the Nation. The Water Resources Council will establish a procedure for relating regional accounts to the rest of the Nation. The use of such reporting regions will not, however, rule out the use of other regions whose delineations are important in measuring beneficial or adverse effects on specified components of the regional development objective.

VII. Cost Allocation, Reimbursement, and Cost Sharing

A. COST ALLOCATION

On the basis of the identification provided for in the system of accounts for beneficial and adverse effects, an allocation of appropriate costs shall be made when an allocation of costs is required for purposes of establishing reimbursement levels, pricing policies, or cost sharing between the Federal Government and non-Federal public and private interests. All objectives and components of objectives shall be generally treated comparably in cost allocation and are entitled to their fair share of the advantages resulting from a multiobjective plan.

B. REIMBURSEMENT AND COST SHARING

Reimbursement and cost-sharing policies shall be directed generally to the end that identifiable beneficiaries bear an equitable share of cost commensurate with beneficial effects received in full cognizance of the multiobjectives. Since existing cost-sharing policies are not entirely consistent with the multiobjective approach to planning water and land resources, these policies will be reviewed and needed changes will be recommended.

VIII. National Program for Federal and Federally Assisted Activities

The principles set forth in this document are concerned with alternative plans for individual projects, States, regions, or river basins. The evaluation, systematic display, and comparison of alternative plans for a project, State, region, or river basin provide the basis for selecting a recommended plan.

The formulation of national programs for Federal and federally assisted water and land resource activities requires that priorities be established among recommended plans for projects, States, regions, and river basins. The system of accounts, together with other criteria, such as available budget resources, national policy toward the environment or regional development, and public and private investment alternatives, will provide a basis for formulating national programs.

IX. Implementation of Principles

The Water Resources Council will implement these Principles by establishing Standards for planning water and land resources in accordance with the Water Resources Planning Act.

The Water Resources Council will establish procedures as necessary to carry out the established Principles and Standards.

Included in the Water Resources Council's Standards and Procedures will be provision for coordination among Federal and State agencies and among public and private interests affected by water and land resource plans.

The Council will also specify appropriate procedures for the review and transmission of planning reports to States, Federal agencies, the Office of Management and Budget, the Council on Environmental Quality, and the Congress. The Council may also provide for review of individual project studies to determine their relationships to regional and river basin plans and their conformance with the Council's evaluation standards. The Council will consider any unresolved coordination problem.

The Water Resources Council will foster needed training and development of manpower, improvements in mathematical and other planning tools, and research to increase the efficiency of planning efforts. The Principles, Standards, and Procedures should be based at any given time on the best available interpretation of conceptual and empirical bases for planning water and land resources. The Council will encourage and support needed improvements in the application of the conceptual and theoretical planning and decisionmaking framework upon which these Principles are based. The Council will also encourage and support improvement in the conceptual and theoretical framework.

The Council in its Standards and Procedures will make adjustments for deviations from the Principles that may be required by law or Executive order.

The Water Resources Council will review these Principles from time to time and after consultation with others will recommend improvements for consideration of the President.

PROPOSED STANDARDS FOR PLANNING WATER AND LAND RESOURCES (DECEMBER 1971)

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I. PURPOSE AND SCOPE

A. AUTHORITY

These Planning Standards implement the Principles for Planning Water and Land Resources approved by the President on _____.

These standards shall apply, as appropriate, to the activities referred to in subsection B of this section except for any adjustments required by law or Executive order. Adjustments required for special situations where the application of these Standards is not practical may be made and will be developed by the concerned agency or entity in consultation with the Water Resources Council.

Although these standards are not binding upon State and local bodies participating in water and land resources planning, it is intended that the standards be broad and flexible enough to accommodate the goals and objectives of such entities. The standards apply to Federal participation in Federal-State cooperative planning and should also provide a useful guide to State and local planning.

The Water Resources Planning Act of 1965, as amended, is found in Appendix A.

B. ACTIVITIES COVERED

1. *Comprehensive planning.* These standards apply to Federal participation in comprehensive framework studies and assessments and regional or river basin planning of water and land resources whether carried out—

(a) By river basin commissions established under the Water Resources Planning Act;

(b) By entities performing the functions of a river basin commission, including, but not limited to, such entities as:

(1) Federal-interstate compact commissions;

(2) Federal-State interagency committees;

(3) Federal-State coordinating committees;

(4) Federal-State development commissions;

(5) Lead Federal agency with special authorization for comprehensive planning;

(6) Other entities designated by the Council engaged in comprehensive water and land resource planning with coordinated Federal technical or financial assistance.

In formulating plans to meet the multiobjectives all alternative means shall be considered, including, but not limited to, water and land programs to be carried out directly by the Federal Government, Federal financial and technical participation in water and land programs to be carried out by State or other non-Federal entities, and Federal licensing activities that affect the development, conservation, and utilization of water and land resources.

2. *Federal and federally assisted programs and projects.* These standards apply to the planning and evaluation of the effects of the following water and land programs, projects, and activities carried out directly by the Federal Government and by State or other entities with Federal financial or technical assistance:

(a) Corps of Engineers civil functions;

(b) Bureau of Reclamation projects;

(c) Federally constructed watershed and water and land programs;

(d) National parks and recreation areas;

(e) Wild, scenic, and recreational rivers;

(f) Wetland and estuary projects and coastal zones;

(g) Federal waterfowl refuges;

(h) Tennessee Valley Authority;

(i) Federal assistance to State and local government sponsored watershed and water and land resource programs (Watershed Protection and Flood Prevention Projects and Resource Conservation and Development Projects).

The Water Resources Council will, as appropriate, with the concurrence of the Office of Management and Budget, amend these standards to add to or delete from the list of programs to be covered.

C. LEVELS OF PLANNING

These standards apply to all levels of planning as defined by the Water Resources Council.

Framework studies and assessments are the evaluation or appraisal on a broad basis of the needs and desires of people for the conservation, development, and utilization of water and land resources and will identify regions or basins with complex problems which require more detailed investigations and analysis, and may recommend specific implementation plans and programs in areas not requiring further study. They will consider Federal, State, and local means and will be multiobjective in nature.

Regional or river basin studies are reconnaissance-level evaluation of water and land resources for a selected area. They are prepared to resolve complex long-range problems identified by framework studies and assessments and will vary widely in scope and detail; will involve Federal, State, and local interests in plan formulation; and will identify and recommend action plans and programs to be pursued by individual Federal, State, and local entities. They will be multiobjective in nature.

Implementation studies are program or project feasibility studies generally undertaken by a single Federal, State, or local entity for the purpose of authorization or development of plan implementation. These studies are conducted to implement findings, conclusions, and recommendations of framework studies and assessments and regional or river basin studies which are found to be needed in the next 10 to 15 years. As with framework studies and regional or river basin studies, they will be multiobjective in nature.

D. RESPONSIBILITY FOR APPLYING STANDARDS

The Federal chairman and the representatives of the Federal agencies participating in a river basin commission established under the Water Resources Planning Act are responsible for applying these standards.

The study director provided or designated by the Water Resources Council or by river basin commissions (in their areas) and Federal members of coordinating bodies established or designated by the Council to carry out framework studies and assessments and regional or river basin planning studies are responsible for applying these standards.

The administrator of each Federal program or federally assisted program

covered under this section is responsible for applying these standards to his program. Each Federal administrator shall follow these standards in establishing agency procedures for evaluation of programs and projects for conservation, development, and utilization of water and land resources.

The Board of Directors of the Tennessee Valley Authority, responsible for framework studies and assessments, regional and river basin planning studies and implementation studies for the Tennessee River Basin, and the Federal representatives of other entities performing the functions of a river basin commission shall apply these standards except for any adjustments required by law or Executive order or for special situations where the application of these standards is not practical.

Proposed Federal agency procedures, and revisions thereto, to implement these standards will be referred to the Water Resources Council for review for consistency with these standards.

E. SCHEDULE FOR APPLYING STANDARDS

After approval of the Principles by the President, the principles and standards will apply to all levels of planning studies except projects which have been authorized or have been submitted to the 92d Congress for authorization prior to the approval date. The principles and standards shall be applied to ongoing planning studies, provided that the responsible agency or entity may request an exception from the Water Resources Council for those studies nearing completion. Plans, programs, or projects which have been authorized by the Congress and on which actual construction or other similar activity has not commenced within 5 years after authorization will be reviewed in accordance with these principles and standards.

II. OBJECTIVES

A. INTRODUCTION

The Principles for Planning Water and Land Resources define the objectives of national economic development, environmental quality, and regional development. These multiobjectives provide the basis for the formulation of project, State, region, and river basin plans for the use of water and land resources to meet foreseeable short- and long-term needs and have been explicitly stated or implied in numerous congressional enactments and Executive actions. The most notable of these actions in water and related areas are summarized below.

In the Flood Control Act of 1936, the Congress declared that benefits of Federal projects should exceed costs. Interpretation of this statute has resulted in development of various analytical procedures to evaluate the benefits and costs of proposed projects. These procedures have centered around a national economic efficiency analysis and were first published as "Proposed Practices for Economic Analysis of River Basin Projects" in May 1950 and revised in May 1958. Budget Bureau Circular No. A–47 was issued on December 31, 1952, informing the agencies of considerations which would guide the Bureau of the Budget in its evaluations of projects and requiring uniform data that would permit comparisons among projects.

On October 6, 1961, the President requested the Secretaries of Interior, Agriculture, Army, and Health, Education, and Welfare to review existing evaluation standards and to recommend improvements. Their report, "Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources," was approved by the President on May 15, 1962, and published as Senate Document No. 97, 87th Congress, 2d Session. This document replaced Budget Bureau Circular No. A–47 and in turn has been superseded by the "Principles for Planning Water and Land Resources," approved by the President on ----------, and these "Standards for Planning Water and Land Resources."

By enacting the laws enumerated below and others, the Congress has broadened the objectives to be considered in water and land resources planning.

The multiobjectives as defined in the principles and set forth in more detail in these standards provide a flexible planning framework that is responsive to and can accommodate changing national needs and priorities.

The statement of the objectives and specification of their components in these standards is without implication concerning priorities to be given to them in the process of plan formulation and evaluation. These standards, nonetheless, do recognize and make provision for a systematic approach by which the general public and decisionmakers can assess the relative merits of achieving alternative levels of satisfaction to several objectives where there may be conflict, competition, or complementarity among them. This will provide the type of information needed to improve the public decisionmaking process.

B. MAJOR CONGRESSIONAL DIRECTIVES

Many laws that give new or more definitive directions to Federal participation in planning for water and land resources have been passed in recent years. Some major enactments are:

The Appalachian Regional Development Act of 1965 (Public Law 89–4), authorizes the preparation of a comprehensive plan for development of water and related land resources of the region as a means of expanding economic opportunities. The plan for water and land resources is to be an integral and harmonious component of the regional economic development program authorized by the Act.

The Federal Water Project Recreation Act of 1965 (Public Law 89–72), provides for full consideration of opportunities for recreation and fish and wildlife enhancement in Federal projects under specified cost allocation and cost-sharing provisions.

The Water Resources Planning Act of 1965 (Public Law 89–80), establishes a comprehensive planning approach to the conservation, development, and use of water and related land resources. The Act emphasizes joint Federal-State cooperation in planning and consideration of the views of all public and private interests. Section 103 of the Act provides that "The Council shall establish, after such consultation with other interested entities, both Federal and non-Federal, as the Council may find appropriate, and with the approval of the President, principles, standards, and procedures for Federal participants in the preparation of comprehensive regional or river basin plans and for the formulation and evaluation of Federal water and related land resources projects."

The Act further provides in section 102(b) that "The Council shall * * * maintain a continuing study of the relation of regional or river basin plans and programs to the requirements of larger regions of the Nation and of the adequacy of administrative and statutory means for the coordination of the water and related land resources policies and programs of the several Federal agencies; it shall appraise the adequacy of existing and proposed policies and programs to meet such requirements; and it shall make recommendations to the President with respect to Federal policies and programs."

The Act also provides in section 301(b) that "The Council, with the approval of the President, shall prescribe such rules, establish such procedures, and make such arrangements and provisions relating to the performance of its functions under this title, and the use of funds available therefor, as may be necessary in order to assure (1) coordination of the program authorized by this title with related Federal planning assistance programs, including the program authorized under section 701 of the Housing Act of 1954 and (2) appropriate utilization of other Federal agencies administering programs which may contribute to achieving the purpose of this Act."

The Water Resources Planning Act, as amended, is attached as Appendix A.[1]

The Public Works and Economic Development Act of 1965 (Public Law 89–136) establishes national policy to use Federal assistance in planning and constructing public works to create new employment opportunities in areas suffering substantial and persistent unemployment and underemployment. The Act provides for establishing Federal-State regional commissions for regions that have lagged behind the Nation in economic development.

The Water Quality Act of 1965 (Public Law 89–234) and subsequent amendments provides for establishing water quality standards for interstate waters. These water quality standards provide requirements and goals that must be incorporated into planning procedures.

[1] Appendix A filed as part of the original document.

In authorizing the Northeastern Water Supply Study in 1965 (Public Law 89–298), Congress recognized that assuring adequate supplies of water for the great metropolitan centers of the United States has become a problem of such magnitude that the welfare and prosperity of this country require the Federal Government to assist in solution of water supply problems.

The Clean Water Restoration Act of 1966 (Public Law 89–753) provides assistance for developing comprehensive water quality control and abatement plans for river basins.

The Department of Transportation Act of 1966 (Public Law 89–670) provides standards for evaluating navigation projects and provides for the Secretary of Transportation to be a member of the Water Resources Council.

The Wild and Scenic Rivers Act of 1968 (Public Law 90–542) provides that in planning for the use and development of water and related land resources consideration shall be given to potential wild, scenic, and recreational river areas in river basin and project plan reports, and comparisons are to be made with development alternatives which would be precluded by preserving these areas.

The National Flood Insurance Act of 1968 (title XIII, Public Law 90–448) provides that States, to remain eligible for flood insurance, must adopt acceptable arrangements for land use regulation in flood-prone areas. This provision, together with Executive Order 11296, August 10, 1966, places increased emphasis on land use regulations and administrative policies as means of reducing flood damages. Planning policies must include adequate provision for these new enactments and directives in an integrated program of flood-plain management.

The Estuary Protection Act of 1968 (Public Law 90–454) outlines a policy of reasonable balance between the conservation of the natural resources and natural beauty of the Nation's estuarine areas and the need to develop such areas to further the growth and development of the Nation.

The National Environmental Policy Act of 1969 (Public Law 91–190) authorizes and directs Federal agencies in the decision-making process to give appropriate consideration to environmental amenities and values, along with economic and technical consideration. The results of this analysis are to be included in proposals for Federal action.

The Environmental Quality Improvement Act of 1970 (title II of Public Law 91–224) further emphasizes congressional interest in improving the environment and the major responsibility that State and local governments have for implementing this policy.

The Flood Control Act of 1970 (Public Law 91–611) includes the following statement: "It is the intent of Congress that the objectives of enhancing regional economic development, the quality of the total environment, including its protection and improvement, the well-being of the people of the United States, and the national economic development are the objectives to be included in federally financed water resource projects, and in the evaluation of benefits and costs attributable thereto, giving due consideration to the most feasible alternative means of accomplishing these objectives."

C. RELATIONSHIPS OF PROGRAM MEASURES TO OBJECTIVES

Formulating courses of action that effectively contribute to the attainment of the multiobjectives is the paramount task of water and land resources planning. These actions are only the means by which multiobjectives can be attained. For instance, providing flood control or preserving a scenic river is meaningful only to the extent that such actions contribute to specific needs that can be related to the multiobjectives. Thus, plans are to be evaluated in terms of their beneficial or adverse effects on the multiobjectives.

These standards relate primarily to the planning of water and land resource programs that contribute to specified components of the multiobjectives. It is recognized that other programs may also contribute to these objectives. In some instances, water and land programs are the only means or are the most effective means to achieve the objectives. In the usual case, however, it is likely that a combination of water and land program and other programs will be the most effective means to achieve the desired objectives. In the formulation of plans, therefore, these standards provide for the consideration of the full range of alternatives relevant to the needs for water and land resources.

A given plan formulated for one or several components of the multiobjectives may affect components of other objectives in a beneficial or adverse manner. This joint effect relationship is a common occurrence in plan formulation. Its presence necessitates that the full range of effects of plans be shown in terms of specified components of objectives regardless of the size of the effect or the component for which an alternative plan has been formulated.

D. OBJECTIVES

1. *National Economic development.* The national economic development objective is enhanced by increasing the value of the nation's output of goods and services and improving national economic efficiency.

National economic development reflects increases in the Nation's productive output, an output which is partly reflected in a national product and income accounting framework designed to measure the continuing flows of goods and services into direct consumption or investment.

In addition, national economic development is affected by beneficial and adverse externalities stemming from normal economic production and consumption, imperfect market conditions, and changes in productivity of resource inputs due to investment. National economic development is broader than that the availability of public goods which are not accounted for in the national product and income accounting framework. Thus, the concept of national economic development is broader tha nthat of national income and is used to measure the impact of governmental investment on the total national output. The gross national product and national income accounts do not give a complete accounting of the value of the output of final goods and services resulting from governmental investments because only government expenditures are included. This is especially true in those situations where governmental investment is required to overcome imperfections in the private market. Therefore, national economic development as defined in these standards is only partially reflected in the gross national product and national income accounting framework.

A similar situation prevails where a private investment results in the production of final public goods or externalities that are not exchanged in the market.

Components of the national economic development objective include:

(a) The value to users of increased outputs of goods and services resulting from a plan. Developments of water and land resources result in increased production of goods and services which can be measured in terms of their value to the user. Increases in crop yields, expanding recreational use, and peaking capacity for power systems are examples of direct increases in the Nation's output which result from water and related land resources developments. Moreover, such developments often result in a change in the productivity of natural resources and the productivity of labor and capital used with these resources. Increased earnings from changes in land use, reduced disruption of economic activity due to droughts, floods and fluctuating water supplies, and removal of constraints on production through increased water supplies are examples of direct increases in productivity from water and land development that contribute to national output.

(b) The value of output resulting from external economies. In addition to the value of goods and services derived by users of outputs of a plan, there may be external gains to other individuals or groups.

2. *Environmental quality.* The environmental objective is enhanced by the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems in the area under study and elsewhere in the Nation. This objective reflects society's concern and emphasis for the natural environment and its maintenance and enhancement as a source of present enjoyment and a heritage for future generations.

Explicit recognition should be given to the desirability of diverting a portion of the Nation's resources from production of more conventional market-oriented goods and services in order to

accomplish environmental objectives. As incomes and living levels increase, society appears less willing to accept environmental deterioration in exchange for additional goods and services in the market place.

Responsive to the varied spiritual, psychological, recreational, and material needs, the environmental objective reflects man's abiding concern with the quality of the natural physical-biological system in which all life is sustained. However, to the extent that man's environmental concerns are expressed in terms of population dispersion, urban-rural balance, urban congestion, and the like, these aspects are contained in the regional development objective.

Components of the environmental objective include the following:

(a) Management, protection, enhancement, or creation of areas of natural beauty and human enjoyment such as open and green space, wild and scenic rivers, lakes, beaches, shores, mountain and wilderness areas, and estuaries;

(b) Management, preservation, or enhancement of especially valuable or outstanding archeological, historical, biological (including fish and wildlife habitat), and geological resources and ecological systems;

(c) Enhancement of quality aspects of water, land, and air by control of pollution or prevention of erosion and restoration of eroded areas embracing the need to harmonize land use objectives in terms of productivity for economic use and development with conservation of the resource;

(d) Avoiding irreversible commitments of resources to future uses: While all forms of development and use affect and sometimes change the tenuous balance of fragile aquatic and terrestrial ecosystems, the implication of all possible effects and changes on such systems is imperfectly understood at the present time. In the absence of absolute measures or standards for reliably predicting ecological change, these planning standards emphasize the need for a cautionary approach in meeting development and use objectives in order to minimize or preclude the possibility of undesirable and possible irreversible changes in the natural environment;

(e) Others: Given its broad and pervasive nature, it is not practical to specifically identify in these standards all possible components of the environmental quality objective. If other components are recognized, they should be explicitly identified and accomodated in the planning process.

3. *Regional development.* Enhancement of regional development comes about through increases in a region's income, increases in employment, and improvement of the economic base, environment, and other specified components of the regional development objective. Water and land resource plans contribute in a variety of ways to a given regional economy. These effects can include the contribution to regional development objectives resulting from plans formulated to meet other objectives as well as contributions to one or more of the explicit regional development objectives.

Components of the regional development objective include:

(a) *Increases in regional income.* As a part of the national economy, analysis of the increase in income for a designated region reflects several parallel components of the national economic development objective. Consequently, increases in regional income embrace the following components of that objective:

(1) The value of increased outputs of goods and services from a plan to the users residing in the region under consideration; and

(2) The value of output to users residing in the region under consideration resulting from external economies caused by a plan.

In addition to the parallel components, regional income includes the value of output in the region under consideration resulting from the use of resources otherwise unemployed or underemployed and net income accruing to the region under consideration from the construction or implementation of a plan and from other economic activities induced by operations of a plan.

(b) *Effects on other components of the regional development objective.* (1) Achieving desirable population dispersal and urban-rural balance through distribution of population and employment opportunities.

The rapid and anticipated continued urbanization of the Nation portends an enormous agenda of social, economic, and environmental problems. Society's current problems of noise, congestion, crime, housing, physical and mental health, education, lack of open space, and general environmental deterioration will be greatly intensified. In view of the diverse and widespread effects of population concentration on society generally, a national policy toward accommodating and better rationalizing the urbanization process including a better urban-rural balance in population and employment is a major component of regional development. Water and land resource programs and projects through the goods and services they provide, as well as the economic expansion opportunities or environmental setting they create, can effectively contribute, together with other programs, to a more desirable distribution of population and employment within each region and throughout the Nation.

(2) Increases in regional employment.

Since employment and employment opportunities provide the means to hold and increase the base population and to otherwise contribute to attainment of a viable economic and social community, they are of concern to all regions. Although there will be exceptions, in general it may be anticipated that increases in regional income discussed above will be compatible with programs for increasing regional employment.

(3) Enhancement of the regional economic base and stability.

A major component of the regional development objective is the attainment of a flexible and responsive economic posture that enables it to withstand the changing composition of the economy over time due to advances in technology, changes in consumer behavior affecting intermediate and final demands, and related changes in production. Where the existing economic base of a region may be too narrow and specialized, public investments in water and land resources can be effective toward broadening its economic base.

(4) Enhancing educational, cultural, and recreational opportunities.

With better distribution of income, population, and employment, the enjoyment of life is enhanced by improved community services, better schools, and more cultural and recreational opportunities in the region.

(5) Enhancement of environmental conditions of concern to the region.

Consistent with the components of environmental objectives set forth above, water and land resource plans can make positive contributions to enhancing components of the environmental objectives that have special significance for the region under consideration.

(6) Enhancement of other specified components of the regional development objective.

III. Beneficial and Adverse Effects

A. Introduction

For each alternative plan there will be a complete display or accounting of relevant beneficial and adverse effects.

Beneficial and adverse effects are measured in nonmonetary terms for comtional economic development objective, for the regional income component of the regional development objective, and for some social factors.

Other beneficial or adverse effects are measured in nonmonetary terms for components of the environmental quality objective, for the nonincome components of the regional development objective, and for most social factors. Estimating these beneficial and adverse effects is undertaken in order to measure the net changes with respect to particular objectives that are generated by alternative plans. For each alternative plan the beneficial and adverse effects on social factors will also be displayed in the system of accounts.

The measurement of the effects in itself, however, does not necessarily constitute a statement that such effects are beneficial or adverse. A decision on this question depends on the nature of preferences regarding each effect. One group may consider an effect beneficial while another group considers it adverse.

Effects on some objectives and components are generally regarded as favorable. These include, for example, gains in national output. For other objectives and components, however, preferences will differ. This will certainly be true of some of the components making up the environmental quality objective. For such

instances, multiobjective planning provides information which should facilitate planning decisions and reduce conflict over such decisions.

1. *Relationship of beneficial and adverse effects to objectives.* Since beneficial and adverse effects have meaning only when identified with an objective, there are beneficial and adverse effects for national economic development, environmental quality, and regional development. Effects of alternative plans on social factors will also be displayed. Also, since beneficial and adverse effects may be of a monetary or nonmonetary nature, they may be measured in dollars or in physical, biological, or other quantitative units or qualitative terms appropriate to the objective.

The objectives are not mutually exclusive with respect to beneficial and adverse effects. Comparisons and evaluations of plans require measurement or quantification of similar effects in terms of common standards. The selected standards may be in terms of dollars, acres of land, acre-feet or cubic-feet-per-second of water, miles of trails or streams, number of people, and so on. The nonmonetary measures must include appropriate qualitative dimensions.

2. *Incidence of beneficial and adverse effects.* The distribution in place and time of beneficial and adverse effects to the multiobjectives is an important consideration in the evaluation of plans. Those who are benefited or adversely affected by a plan may be located within the planning area or region, or they may be in an area or region immediately adjacent, or they may be in distant regions which are noncontiguous with the planning area. The beneficial and adverse effects may also occur immediately or in the future in any of the areas or regions.

3. *With and without analysis.* In planning water and land resources, beneficial and adverse effects of a proposed plan should be measured by comparing the estimated conditions with the plan with the conditions expected without the plan. Thus, in addition to projecting the beneficial and adverse effects expected with the plan in operation, it is necessary to project the conditions likely to occur in the absence of a plan. Economic, social, and environmental conditions are not static, and changes will occur even without a plan. Only the new or additional changes that can be anticipated as a result of a proposed plan should be attributed as beneficial and adverse effects of the plan.

4. *Monetary beneficial effects.* For many goods and services the conventional market mechanism or simulation thereof provides a valid measure of exchange values, expressed in monetary terms. The values determined by the market may need adjustment to account for imperfect market conditions. Contributions to national economic development and the income component of regional development are of the monetary type of beneficial effects. In addition, certain components of the environmental objective can be analyzed in terms of monetary values as can effects on social factors.

5. *Monetary adverse effects.* Adverse effects toward the multiobjective result, just as beneficial effects do, from the implementation of a particular plan. Values for some adverse effects can be based on or derived from actual or simulated market prices. For example, the costs of goods and services used in constructing and operating a project or payment for damages even though no goods or services are being acquired can be derived from actual market prices. The prices determined by the market may need adjustment to account for imperfect market conditions. Some adverse effects are not represented by actual cash expenditures; but market prices can be used to estimate or derive the appropriate monetary values by use of a simulated market price or by observing market prices for similar goods and services.

6. *Nonmonetary beneficial effects.* There are many effects which cannot or should not be expressed in monetary values. This is true of many contributions to the environmental quality objective and to several of the components of the regional development objective as well as effects on social factors.

When effects cannot or should not be expressed in monetary terms, they will be set forth, insofar as is reasonably possible, in appropriate quantitative and qualitative physical, biological, or other measures reflecting the enhancement or improvement of the characteristics relevant to the components of the objective under consideration.

When specified minimum technical or institutional standards related to environmental quality and regional development objectives will be met or otherwise exceeded, they will be explicitly identified.

If particular nonmonetary beneficial effects or services are not amenable to quantitative measurement, they should be described as fully as possible in appropriate qualitative terms.

7. *Nonmonetary adverse effects.* There are adverse effects that cannot be valued by market prices and direct compensation for these adverse effects may not be possible. Nevertheless, they should be accounted for by use of appropriate nonmonetary values or described as carefully as possible. The nonmonetary values may be expressed in terms of a physical, biological, or other quantitative units or qualitative terms.

The adverse effects of a nonmonetary nature will generally be related to the environmental quality objective and to several of the components of the regional development objective. Adverse effects on social factors may also be expressed in nonmonetary terms.

B. BENEFICIAL EFFECTS OF NATIONAL ECONOMIC DEVELOPMENT

Beneficial effects of national economic development are the increases of the value of the output of goods and services and improvements in national economic efficiency.

1. *General measurement concepts.* There are two basic sources of increased output of goods and services that contribute toward enhancing national economic development. First, additional resources may be employed using normal production techniques, as, for example, in the application of irrigation water and other associated resources to land for the production of agricultural commodities or in the use of electric power and other associated resources for the production of aluminum. Second, resource productivity changes may be induced by the plan, resulting in more efficient production techniques to be used to achieve a higher level of output from the same resources or the same level of a specific output with fewer resources than would be achieved without the plan. In the latter case, the release of productive resources which can be employed elsewhere in the economy for the production of other goods and services ultimately results in an increase in national output as a consequence of a plan. These two sources of increased output may apply to situations in which the plan results in the production of final consumer goods or intermediate producer goods utilized by direct users; and they may also apply in situations in which firms are indirectly affected through economic interdependence with firms which utilize the intermediate producer goods from the plan.

For convenience of measurement and analysis, beneficial effects of national economic development are classified as follows:

a. The value to users of increased outputs of goods and services from a plan; and

b. The value of output resulting from external economies caused by a plan.

In each case, with and without analysis must be applied to ascertain that with a plan there is a net increase in the production of goods and services, regardless of source, over those that would be obtained in the absence of the plan.

The general measurement standard for increases in the national output of goods and services will be the total value of the increase, where total value is defined as the willingness of users to pay for each increment of output from a plan. Such a value would be obtained if the "seller" of the output was able to apply a flexible unit price and charge each user (consumer) an individual price to capture the full value of the output to the user. This concept is illustrated in figure 1.

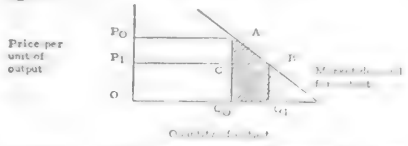


FIGURE 1.—Total value or willingness to pay for increased output.

Assuming the normal demand-output relationship, additional plan output will be taken by users as the unit price of output falls. If, as a result of the plan, output is increased by an amount $Q_1—Q_0$, the total value of this additional output

to the users is measured by the entire shaded area on the chart. This is a larger amount than would be reflected by the market value. It is the sum of market price times increased quantity (represented by the rectangle CBQ_1Q_0) plus the consumer surplus for that increase (represented by the triangle ABC).

Since, in most instances, it is not possible for the planner to measure the actual demand situation, three alternative techniques can be used to obtain an estimate of the total value of the output of the plan—willingness to pay, change in net income, and the most likely alternative.

If the additional output from a plan is not expected to have a significant effect on price, actual or simulated market prices will closely approximate the total value of the output. This is true because there would be no consumer's surplus. If the additional output is expected to significantly influence market price (as in figure 1), a price midway between that expected with and without the plan may be used to estimate the total value. This would approximate the willingness to pay, including consumer surpluses, in most cases.

When outputs of a plan are intermediate goods or services the net income of the (producer) uses may be increased. Where changes in net income of each individual user can be estimated, a close approximation of the total value of the output of the plan (including consumer surpluses) will be obtained.

The cost of the most likely alternative means of obtaining the desired output can be used to approximate total value when the willingness to pay or change in net income methods cannot be used. The cost of the most likely alternative means will generally mistate the total value of the output of a plan. This is because it merely indicates what society must pay by the next most likely alternative to secure the output, rather than estimating the real value of the output of a plan to the users. This assumes, of course, that society would in fact undertake the alternative means. Because the planner may not be able to determine whether alternative means would be undertaken in the absence of the project, this procedure for benefit estimation must be used cautiously.

Application of these general measurement standards will necessarily vary, depending upon the source by which output is increased (that is, via direct increases in production or through subsequent employment of released resources), upon the type of good or service produced (whether the output is an intermediate or final good), and upon the type and nature of available alternatives. General measurement standards for each type of situation as well as an indication of the water and land resource plan outputs to which these Standards are applicable are presented below.

a. *Direct output increases.* Direct outputs of water and land resource plans may be in the form of either final consumer goods or intermediate goods. An effective direct or derived demand must exist for the final and intermedite goods, respectively, to include the increased output as a contribution to national economic development.

Certain consumer goods and services may result directly from water projects and be used with no additional production resulting therefrom. Recreation, municipal water, and electric power for residential use are examples of this type of good or service. Most goods and services produced by water projects are not directly consumed, however, but are intermediate products that serve as inputs for producers of final goods or producers of other intermediate goods. The development of irrigation water for use in producing food and fiber or supplying electric power and water for industry are examples.

The value of increased output resulting directly from plans that produce final consumer goods or services is properly measured as the willingness to pay by final users for such output. When a competitive market price is not directly available, and the increased output will not be large enough to affect prices, total value of output may be estimated by simulated market prices or the use of the cost of the most likely alternative means of producing such final output. Examples of types of outputs to which this standard may be applied include:

a. Community and residential water supply;

b. Electric power provided for community and residential use; and

c. Recreation enhancement.

The value of increased output of intermediate goods and services is measured by their total value as inputs to producers of final consumer products. The intermediate product from the plan may enable the producers to increase production of final consumer goods, or reduce costs of production which in effect releases resources for use elsewhere in the economy. In either case, the total value of the intermediate goods or services to the producer is properly measured as the increase in net income received by the producers with a plan as compared with the net income received in the absence of a plan. Net income is defined as the market value of producers' outputs less the market value of producers' inputs exclusive of the cost of the intermediate goods or services resulting from a plan. Examples of types of plan outputs to which this standard may be applied include:

a. Agricultural water supply; and

b. Agricultural flood damage alleviation, land stabilization, drainage, and related activities.

Where net income changes cannot be directly determined, however, the value of the intermediate goods and services to producers will be measured either in terms of competitive market values, when competitive conditions exist, or approximated by the cost of the likely alternative that the producers would utilize in the absence of a plan to achieve the same level of output. Examples of types of plan outputs to which this standard may be applied include:

a. Industrial and commercial water supply;

b. Urban flood damage alleviation;

c. Electric power provided for industrial, commercial, and agricultural uses;

d. Transportation; and

e. Commercial fishery enhancement.

b. *Increases in output resulting from external economies.* Increased output of individual firms or industries directly affected by the plan may create situations in which related firms or industries are able to take advantage of more efficient production techniques; or consumers may be indirectly affected by a project (such as through favorable environmental changes). Such productivity changes or technological external economies can be attributed as a benefit to a plan. For example, higher levels of output by directly affected firms may enable subsequent processing firms to use more efficient processing techniques and thereby release resources for use in producing other goods and services or permit the higher level of output to be processed with no additional resources.

Present techniques are not well developed for measuring the beneficial effects accruing from external economies. However, in situations where it is thought that the increased output of final consumer goods or intermediate goods used by direct users can be expected to increase the productivity or output of related firms, an attempt should be made to measure the net income change resulting from such externalities. When this is done the methodology should be carefully documented in the report.

2. *Measurement of the value to users of increased outputs*—a. *Water supply.* Plans for the provision of water supply are generally designed to satisfy requirements for water as a final good to domestic and municipal users and as an intermediate good to agricultural and industrial users. Provision of water supply to satisfy requirements in these uses generally requires, either separately or in combination, an increase in water quantity, an improvement in water quality, and an improvement in the reliability of both quantity and quality.

Where it is necessary to use alternative costs for approximation of total value for water supply, as provided herein, the alternative selected must be a likely and realistic alternative directly responsive to achievement of this particular category, namely the additional output of water as an input to industrial, agricultural, and municipal uses or as a final good for community and individual uses. Moreover, the alternative must be a viable one in terms of engineering and financing and must be institutionally acceptable. It must be more than a hypothetical project. It must be a real alternative that could and would likely be undertaken in the absence of the proposed program, for instance, the reuse or recycling of existing water supplies or the use of available groundwater, including the improvement of its quality, if necessary.

Although water supply can often be considered as a final good, there usually does not exist a market value in terms of

price that directly expresses users' valuation of water supply for community and individual use. When this is the case, the total value of the water may be derived using the cost of the alternative that would provide essentially a comparable water supply service, in both quantity and quality, that would in fact be utilized in the absence of the water supply provided by the plan. Where such an alternative source is not available or would not be economically feasible, a market value for the water may be derived on the basis of the price paid by other like users or the average cost of a comparable water service from municipal water supply projects planned or recently constructed in the general region.

The total value of water to the producers using increased supplies is reflected in the change in their net income with a plan for the provision of water supply compared with their net incomes without the plan. It is recognized that for many planning studies it is not possible to either specifically identify net income changes accruing to firms using water supply for productive purposes or always possible to determine what part of a municipal supply is used for productive pursuits or for general community or individual uses as set forth below. In these cases, total value to the users can be approximated by use of the cost of the alternative that would be employed to achieve the same production that would be utilized in the absence of the water supply provided by a plan.

Water supply for irrigation is an input to the production of food and fiber. This may result in a net increase in production of specified products, the reduction in production cost, or a combination of both. Beneficial effects from the application of irrigation water supplies will be based upon total value to agricultural producers and will be measured as the increase in net farm income with and without a plan for providing irrigation water. This may be measured directly as the sum of net incomes of farm enterprises benefiting from a plan for irrigation.

Gross farm income comprises total annual receipts from the sale of crops, livestock, livestock products, and the value of perquisites, such as the rental value of the farm dwelling and the value of farm products consumed by the farm family.

Farm expenses are the costs necessary by produce and market farm products and maintain and replace all depreciable items.

Increased net income is measured as the difference between the increase in gross farm income minus the increase in farm expenses analyzed with and without a plan. Changes in net farm income may be estimated by analyzing changes in gross farm income and expenses for each separate enterprise or by the use of representative farm budgets.

b. *Flood control, land stabilization, drainage, and related activities.* A number of activities, such as flood control and prevention, flood-plain management, drainage, prevention of sedimentation, land stabilization, and erosion control, contribute to multiobjectives through improving the productivity, use, and attractiveness of the Nation's land resources. From the viewpoint of their contribution to the objective of national economic development, the effect of these activities on the output of goods and services is manifested by increasing the productivity of land or by reducing the costs of using the land resources, thereby releasing resources for production of goods and services elsewhere. These activities affect land resources in the following manner:

a. Prevention or reduction of inundation arising from stream overflow, overland waterflow, high lake stages, and high tides, and prevention of damage from inadequate drainage;

b. Prevention or reduction of soil erosion, including sheet erosion, gullying, flood-plain scouring, streambank cutting, shore or beach erosion, and prevention of sedimentation; and

c. Prevention or limitation of the uses to which specified land resources will be put.

There are essentially three types of effects on use that may occur as a benefit from including these activities in a plan. The first is an increase in the productivity of land without a change in land use. The second is a shift of land resources to a more intensive use than would occur in the absence of a plan. The third is a shift of land resources to less intensive use than would occur in the absence of a plan. In each case, the general benefit standard is applicable. The distinction is made only to facilitate the application of the general standard in different settings and as a means of providing criteria for the use of alternative techniques for estimating net income changes for the three classes of land utilization under the with and without analysis.

The general standard to be applied in measuring effects for these and any other activities that result in a change in net productivity or a reduction in the cost of using land resources involves the measurement of the difference in net income accruing to users of land resources benefiting from such activities compared with what these users would earn in the absence of such a plan. This generally defines and establishes the limit of the willingness of users to pay for a plan that results in a change in productivity or reduction in the cost of using land resources.

Willingness to pay of the users, which is the basis for approximating the value of output from these activities, whether it be in the form of increased production of intermediate or final goods or release of resources, may be obtained by the following approaches.

(1) *Productivity increase.* In this situation, analysis with and without the plan indicates that the current and future enterprises employing given land resources are essentially the same with the plan as they would be without the plan. Further, it is more profitable for the given enterprise to continue to use the given land resource even without the beneficial effect of the plan than to locate at the next most efficient location. Net income change can then be measured as the difference in net income accruing to the enterprise on the specified land resource without the plan compared with what that enterprise would receive as net income with the plan on the same land resource.

(2) *Changes in land use.* Two situations are covered by changes in land use. These are:

(a) The situation in which the landowner benefiting from the change in land use would only utilize the land resource affected by such activity once the plan has become operative. In other words, it would not be as profitable for the benefiting landowner to utilize the affected land resource unless improved through one of the activities in this category as compared with the next most efficient location. Without such a plan the improved enterprise would occur at an alternative location. Net income change to the landowner will be measured as the difference in net income from the enterprise at an alternative location that would be utilized without the plan compared with the net income received from the enterprise at a new location which is improved or enhanced as a result of the plan.

(b) The situation in which enterprises that would otherwise employ a given land resource would be precluded from using the given land resources with implementation of the plan. Other enterprises less prone to incur flood damages or other adverse consequences would be allowed to use the given land resources.

Beneficial effects to the enterprises from activities in this category would be evaluated by measuring the net income change for the enterprise precluded from using the given land resources with the plan as compared with the without situation, plus the net income change for the enterprise that would be allowed to use the given land resource with the plan as compared with the without situation.

(3) *Estimates of damage prevention and other measures.* In the above cases, where it is not possible to directly employ net income changes to derive benefits, the estimate of actual or prospective damages to the physical properties of the enterprises involved can be employed as an approximation of net income change.

In the case of productivity change, where development will be the same with and without the plan, benefits attributable will equal total damages reduced. For the intensive land use cases, where development or use of land will be different with and without the plan, benefits can be approximated as equal to the damages these enterprises could sustain in the absence of protection if located on the affected land.

As a check on benefits derived in the form of net income change or damages prevented, observations of changes in land values for all lands may be employed.

c. *Power.* With respect to the computation of beneficial and adverse effects

of increases in output of electric power, it is emphasized that where appropriate, these should be viewed and evaluated as increments to planned or existing systems. Power supplied for general community and residential use can be considered as a final consumer good. Its value as a final good is generally reflected by the satisfaction of individual residents or in terms of improved community services and facilities. Electric power provided to industrial, commercial, and agricultural uses is viewed as an energy input to the production of goods and services from these activities, resulting in an increase in the output, reduction in the cost of production, or a combination thereof. The total value of electric power to the producers using such power is reflected in their willingness to pay. Where the identification and measurement of willingness to pay and satisfactions accruing to activities using electric power for industrial, municipal, and residential purposes are not possible, total value to the users will be approximated by taking account of the cost of power from the most likely alternative source and using this as the measure of the value of the power creditable to the plan. The alternative selected must be a viable one in terms of engineering, and the financing should be that most likely to the constructing entity. The costs should include any required provisions for protection of the environment. However, since the addition of a hydroelectric project to an electric system in lieu of an alternative power source usually will either increase or decrease the unit cost of producing power by existing generating facilities of the system, this cost differential must be taken into account in determining the power value of the hydroelectric project.

Normally, electric power is evaluated in terms of two components—capacity and energy. The capacity value is derived from a determination of the fixed costs of the selected alternative source of supply. The energy value is determined from those costs of the alternative which relate to and vary with the energy output of the alternative plan. These capacity and energy components of power value are usually expressed in terms of dollars per kilowatt per year of dependable capacity and mills per kilowatt-hour of average annual energy.

d. *Transportation (navigation).* Plans for the provision of transportation through inland waterways and harbors are established to complement or extend the overall national transportation system within and among regions to achieve an improved movement of goods from the producer to the consumer.

(1) *Movement of intermediate or final goods.* Transportation as applied to industrial, commercial, and agricultural activities is viewed as an essential service input resulting in savings and creation of utilities in the distribution of intermediate and final goods and services.

The beneficial effects from the movement of traffic are related to the improvements in the transportation services provided, enabling the widespread distribution of goods and services, and are measured as:

a. The savings in the movement of commodities on the waterway when compared with movement via existing alternative modes; and

b. The expressed willingness to pay by the shippers (producers) of commodity or traffic flow newly induced by a navigation improvement as reflected in the change in their net income.

(2) *Where traffic will move in the absence of the waterway improvement.* In this situation, navigation studies would include an estimate of the savings to shippers via the considered navigation improvement, measured as the product of the estimated traffic and the estimated unit savings to shippers from the movement of that traffic via the proposed navigation improvement. The unit savings would be measured as the difference between the charges shippers actually incur for transportation at the time of the study and the charges they would likely incur for transportation via the improvement.

The traffic that is estimated to move via the proposed waterway will be based on a thorough analysis of the existing traffic movements in the tributary area. The potential traffic will be carefully screened to eliminate those movements that are not, for a variety of reasons, susceptible to movement on the waterway. The traffic available for water movement after the screening process is completed will be subject to an analysis of savings as discussed immediately below, and, based on the magnitude of the indicated savings, a decision will be made as to whether or not the movement would be directed to the waterway. Only traffic for which the differences in savings is judged sufficiently large to divert the traffic to the waterway will be included in the estimated waterway traffic. Moreover, as a practical matter, it will be deemed realistic to assume a sharing of the total traffic movement among alternative modes rather than to assume complete diversion to the lower cost mode.

The estimate of savings will ordinarily be developed by comparing the full charges for movement from origin to destination via the prevailing mode of transportation with the charges via the waterway being studied, where these charges encompass all applicable handling, switching assessorial charges, and net differences in inventory, storage, or other charges due to the change in transportation mode. The alternative modes of transportation to be used in estimating savings to shippers are those actually iin use at the time of the study for moving the traffic in question, or, where there are no existing movements, those modes that would most likely be used for such movements. In the latter case, the alternative mode will be chosen on the basis that the shipper would take advantage of the mode affording him the lowest total charges. The competitive, or complementary, effects of existing and authorized waterways not yet constructed, including joint land-waterway routes, should also be taken into account.

(3) *Where additional flow of traffic is induced by the plan.* By making new sources of supply, or by increasing the net demand for a commodity, the navigation improvement may induce more traffic movement than would be the case in the absence of such improvement. Beneficial effects creditable to the plan for such new traffic are the differences between the cost of transportation by the waterway and the value to shippers, that is, the maximum cost they would be willing to pay for moving the various units of traffic involved.

Where data are available for estimating the value at which various increments of the new traffic could be moved economically, the difference between such values and the charges for transportation by the waterway provides a measure of the estimated beneficial effects attributable to the plan.

In the absence of such data, the probable average charge that could be borne by the induced traffic may be assumed to be half way between the highest and the lowest charges at which any part of it would move. On this basis, the difference between this average and the cost by the waterway applied to the volume of new traffic is the beneficial effect of the plan.

(4) *Basis for evaluation.* Congress has provided the standard for computing the beneficial effects of navigation in section 7(a) of the Department of Transportation Act of 1966, as follows:

> * * * the primary direct navigation benefits of a water resource project are defined as the product of the savings to shippers using the waterway and the estimated traffic that would use the waterway; where the savings to shippers shall be construed to mean the difference between (a) the freight rates or charges prevailing at the time of the study for the movement by the alternative means and (b) those which would be charged on the proposed waterway; and where the estimate of traffic that would use the waterway will be based on such freight rates, taking into account projections of the economic growth of the area.

Consistent with the approach above outlined, these criteria are the basis on which beneficial effects for waterway plans will be evaluated.

e. *Recreation.* As national living standards continue to rise, the average person, with basic needs provided for, uses an increasing percentage of rising real income to satisfy a demand for leisure time and outdoor recreational activities such as swimming, picnicking, boating, hunting, and fishing. With general ownership of automobiles and improvement in highways, travel to distant public recreational areas has become commonplace. Consequently, a large and increasing portion of recreational demand, especially that portion which is water-oriented, is accommodated by development of Federal lands and multipurpose reservoirs which include specific provision for enhancing recreation activities. This is consistent with the requirements of the Federal Water Projects Recreation Act of 1965 (Public

Law 89–72), providing for recreation and fish and wildlife as full and equal partners with all other purposes in Federal water projects.

For the most part, outdoor recreation is produced publicly and distributed in the absence of a viable market mechanism. While the private provision of recreation opportunities has been increasing in recent years, analysis of recreation needs is conducted in the absence of any substantial amount of feedback from effectively functioning markets to guide the evaluation of publicly produced recreation goods and services. Under these conditions—and based on a with and without analysis—the increase in recreation provided by a plan, since it represents a direct consumption good, may be measured or valued on the basis of simulated willingness to pay. In computing the projected recreation demand, however, the analysis should take explicit account of competition from recreation opportunities within the area of influence of the proposed plan.

There are in existence a number of methods, or approaches, to approximating demand and what people are willing to pay for outdoor recreation. A generalized methodology encompassing the travel-distance approach is set forth below.

(1) *An analytical approach relating travel cost to distance.* Using marginal travel costs (i.e., variable costs of automobile operation directly related to the number of miles driven) taken as a measure of what people are willing to pay for water-oriented recreation and how price affects use, the relationship between price and per capita attendance can be established for recreation sites and market areas. This relationship, the conventional demand curve having a negative slope, sums up the response of users' demand to alternative prices of the recreational product (or experience). Separate demand curves are constructed to reflect each kind of recreation use, whether day-use travel, camping-use travel, or other. If there is no entrance charge at the project, per capita rates for each distance or travel cost would be consistent with the constructed demand curves.

If a fee is charged, however, the cost to the recreationist would then be equal to the fee plus his travel cost, thus diminishing the per capita use rate. Applying a range of reasonable entrance fee charges to the constructed demand schedules, additional separate day-use and camping-use demand curves for sites are constructed to determine respective attendance which may be expected under such conditions. Following this, initial project year day-use and camping-use values are computed by measuring the area under their respective demand curves. These values can be compared with market projections and existing capacities to determine if actual site demand will materialize. The initial year values are then projected throughout the life of the project consistent with the calculated recreational use predictions. The resultant figures, total values for day use and camping use over the life of the project, are separately discounted at the prevailing discount rate established by these standards to obtain average annual equivalent values.

(2) *Other approaches.* A variety of other approaches may be taken toward the evaluation of recreation goods and services. In general, however, no one method is completely satisfactory to the exclusion of all others. The applicable rule to follow, taking cognizance of the unique circumstances or setting of a particular setting, including the availability of actual market data and experience, is to use that procedure which appears to provide the best measure or expression of willingness to pay by the actual consumer of the recreation good or service provided by the plan.

In the interim, while recreation evaluation methodology is being further developed, the following schedule of monetary unit values may be used in the preparation of plans.

(3) *Simulated prices per recreation day.* A single unit value will be assigned per recreation day regardless of whether the user engages in one activity or several. The unit value, however, may reflect both the quality of activity and the degree to which opportunities to engage in a number of activities are provided.

Type of Outdoor Recreation Day	*Range of Unit Day Values*
General ---------- (A recreation day involving primarily those activities attractive to the majority of outdoor recreationists and which generally require the development and maintenance of convenient access and adequate facilities.)	$0.75–$2.25
Specialized ---------- (A recreation day involving those activities for which opportunities, in general, are limited, intensity of use is low, and often may involve a large personal expense by the user.)	3.00– 9.00

Two classes of outdoor recreation days, general and specialized, are differentiated for evaluation purposes. Estimates of total recreation days of use for both categories, when applicable, will be developed.

The general class constituting the great majority of all recreation activities associated with water projects embraces the more usual activities, such as for example, swimming, picnicking, boating, and most warm water fishing.

In view of the fewer alternatives available and the likelihood that higher total costs are generally incurred by those engaged in hunting and fishing activities compared with those engaged in other types of outdoor recreation, it may be anticipated that the monetary unit values applicable to fish and wildlife recreation will ordinarily be larger than those applied to other types of recreation.

The special class includes activities less often associated with water projects, such as big game hunting and salmon fishing.

A separate range of values is provided for each class in order that informed judgment may be employed in determining the applicable unit values for each individual project under consideration. Where considered appropriate, departure from the range of values provided is permissible if a full explanation is given.

f. *Commercial fishing and trapping.* Water and land resource plans may include specific measures designed for the purpose of enhancing the fish and wildlife resources and associated opportunities for the direct harvesting of fish and game as a commercial product. Beneficial effects to commercial fishing, hunting, and trapping consist of the value of an increase in the volume or quality of the products expected to be marketed. This increase is determined by comparing values of future production with and without the plan.

The beneficial effects from the increase in output of fish and wildlife products resulting from a plan is measured as the total value to the final users of the output reflected by the applicable market price, minus the expenditures incurred to obtain the fish or game.

g. *Other program outputs.* In addition to the more common outputs which have been dealt with in the preceding sections, plans may produce other goods and services which contribute to national economic development. Proper application of the measurement standards to these additional outputs should be guided by analogy to the outputs which have been discussed. Care must be exercised in defining types of outputs to assure that overlapping categories are not used which lead to duplication in the estimates of beneficial effects.

3. *Measurement of increases in output resulting from external economies.* Technological external economies are the beneficial effects or individuals, groups, or industries that may or may not benefit from the direct output of the project. They result from a plan if an increase in the output of final consumer goods or intermediate goods takes place beyond that which would be obtained in the absence of the plan and over and above direct outputs of the plan. This increased output may result from firms which are economically related to the plan taking advantage of more efficient production techniques and thereby releasing resources for use in producing other goods and services. The change in net income of the economically related firms will be used as an indicator of the value of this type of national economic development effect. Changes in the total value of consumer goods due to externalities because of a plan can be accounted for by using measurement techniques like those described above.

If society would obtain the project output of final consumer goods or the output of firms that utilize the intermediate goods of the project from some other source in the absence of the project, then the net income position of the related firms would be unaffected by the plan.

Some examples of potential situations for the occurrence of external economies associated with final consumer goods and

intermediate produced goods are presented below.

a. *Final consumer goods.* Provision of additional recreation opportunities and fish and wildlife enhancement for the direct enjoyment of individuals may enable merchants of sporting goods and other suppliers of recreation equipment and services to increase their sales and net income. However, to the extent that the increased expenditures for outdoor sporting equipment and other outdoor recreation services substitute for some other consumer expenditures, there is no real gain in the Nation's output.

The provision of either water supply or electric power for community and residential use will not generally stimulate external economies to enhance national economic development. It is usually assumed that the necessary quantities of these outputs will be provided by some alternative means in the absence of the plan. As a consequence, firms that are economically related to consumers through the consumption of these products will experience the same economic conditions and have the same net income without the plan as compared with the plan.

b. *Intermediate producer goods.* The utilization of intermediate goods and services from the plan by direct users may enable them to expand their output. Increased levels of output by direct users of the output of a plan may, in turn, enable economically related firms to improve the efficiency of their operation and/or expand their output and, as a result, increase their net income. Measurement of the change in the net income position of related firms should be made, if it can be definitely established that a change in output by the direct users will generate a corresponding income change for the related firms.

An evaluation should be made of the output levels that will be achieved by the direct users with the plan and without the plan. If the direct users would obtain the same good or service from some other source in the absence of the plan, no external economies occur and the net income position of the related firms would be unaffected by the plan. Some examples of types of plan outputs to which this standard may be applied are presented below.

In situations where water supply is an intermediate good, its utilization by direct users may stimulate more inputs to be acquired from supplying firms, and if there is an increased output from the enterprise of the direct user additional output will be processed by related processing firms. Except for irrigation water supplies and a few industries with high water requirements, water represents a relatively small consideration in the management decision of firms. If firms or industries with relatively small water requirements would obtain their necessary water from some other source in the absence of the plan, no external economies should be included in the calculation of water supply benefits.

The provision of flood control, land stabilization, drainage, and related programs may affect the productivity of land resources resulting in increased levels of output by firms directly affected by the plan. Net income changes may also occur in economically related firms. Measurement of the net income change of the related firms should be made if it can be definitely established that a change in output by the direct users will generate a corresponding income change for the related firms. However, if the plan merely enables economic activities to shift to new locations resulting in more efficient production but no change in total output, then no external economies occur and no attempt should be made to measure net income changes of related input supply or output processing firms.

Electric power provided for industrial, commercial, and agricultural uses will frequently result in higher levels of output from these economic sectors. However, if alternative electric power or alternative energy sources would be utilized in the absence of the plan, the level of output would be unaffected and no external economies would accrue as a benefit to the plan.

To the extent that navigational facilities provide alternative transportation services that would otherwise be provided in the absence of the project, no external economies occur. In situations where the navigational facility provides a unique service, such as providing movement of bulky raw materials that would not otherwise be made available, external economies may occur to the firms economically related to the shippers.

C. ADVERSE EFFECTS ON NATIONAL ECONOMIC DEVELOPMENT

Achievement of beneficial effects of national economic development, environmental quality, or regional development requires resources to be diverted from alternative uses. The adverse effects on national economic development are the economic value that these resources would have in their alternative uses. Generally, market prices provide a valid measure of the values of goods and services foregone in alternative uses. Both public and private costs associated with the plan will be measured to indicate the total adverse effect on national economic development incurred to realize the desired objectives.

1. *Sources of adverse effects.* Water and land resource plans result in adverse effects to national economic development in two ways.

a. *Resource requirements to produce final or intermediate goods and services.* In situations where a physical structure is necessary to obtain the desired objective, the adverse effects on national economic development include all explicit cash expenditures for goods and services necessary to construct and operate a project throughout a given period of analysis. They consist of actual expenditures for construction; transfers from other projects, such as costs for reservoir storage; development costs; and interest during construction. If the output of the plan is an intermediate good or service, the associated costs incurred by the intermediate product user in converting it into a marketable form will be measured. These associated costs are borne by the user of the plan output but, nevertheless, represent resource requirements necessary to convert the project output into a product demanded by society. Examples are production costs incurred by users of plan outputs, and costs to other producers or to processors that arise in conjunction with the physical flow of the output of the plan. Associated costs should be deducted from the value of gross outputs to obtain net beneficial effects to be compared with the national economic development adverse effects of a plan.

In situations where nonstructural measures are used to obtain the desired objective, the adverse effects on national economic development will include payments to purchase easements or rights-of-way and costs incurred for management arrangements or to implement and enforce necessary zoning. In some cases, actual cash expenditures will not be involved as when local communities are required to furnish lands, easements, and rights-of-way.

b. *Decreases in output resulting from external diseconomies.* External diseconomies are adverse economic effects of a plan that are not reflected in market prices of project inputs. They result when provision of goods and services for one group necessarily results in an undesirable effect or disservice for another group. For example, the return flow from an irrigation project may create a salinity condition for downstream water users, forcing them to adopt higher cost water treatment practices. These adverse effects (external diseconomies) are not compensated, yet they should be taken into account when deciding on the desirability of a plan.

Another type of external diseconomy may occur if the plan has the direct effect of reducing the output of some firms in the project area, and this reduction causes firms that are linked to the directly affected firms to become less efficient in their operation. For example, the reduction in output by a group of firms which have their output processed by another firm may result in an inefficient operation by the processing firm.

A third type of external diseconomy may occur if the plan has an adverse direct effect on the consumption by individual consumers. For example, if a plan is instrumental in increasing congestion or pollution which results in increased costs to the consumers, this effect should be taken into account in plan evaluation.

2. *Measurement of adverse effects*—a. *Resource requirements of the plan.* Resource requirements of the plan are the sum of the market values of the goods and services used for installations; interest during construction; operation, maintenance, and replacement; and induced costs as defined below.

Installation costs are the market values of goods and services necessary to implement a plan and place it in operation, including management and organizational

arrangements, technical services, land, easements, rights-of-way, and water rights; initial and deferred construction; capital outlays to relocate facilities or to prevent or mitigate damages; transfers of installation costs from other projects; and all other expenditures for investigating, surveying, planning, designing, and installing a plan after its authorization.

Operation, maintenance, and replacement costs are the market values of goods and services needed to operate an installed plan and to make repairs and replacements necessary to maintain the physical features in sound operating condition during their economic life.

b. *Decreases in output resulting from external diseconomies.* While external diseconomies are difficult to measure and the effects are incidental to the project, they are nevertheless recognized adverse effects.

Induced costs are all significant adverse effects caused by the construction and operation of a plan expressed in terms of market prices and whether or not compensation is involved. Compensation for some induced costs is neither required nor possible. Induced costs include estimated net increases in the cost of government services directly resulting from the project and net adverse effects on the economy, such as increased transportation costs.

D. BENEFICIAL AND ADVERSE EFFECTS ON THE ENVIRONMENTAL OBJECTIVE

A water and land use plan may have a variety of effects—beneficial and adverse—on the environmental objective. While effects on the environmental objective are characterized by their nonmarket, nonmonetary nature, they provide important evidence for judging the value of proposed plans.

Environmental quality beneficial effects are contributions resulting from the management, preservation, or restoration of one or more of the environmental characteristics of an area under study or elsewhere in the Nation. Such contributions generally enhance the quality of life.

Adverse environmental effects—generally the obverse of beneficial environmental effects—are consequences of the proposed plan that result in the deterioration of relevant environmental characteristics of an area under study or elsewhere in the Nation, for example, acres of open and green space, wilderness areas, estuaries, or wildlife habitat inundated or altered, or of lands experiencing increased erosion. Such adverse effects generally detract from or diminish the quality of life.

Often, however, an environmental impact of a plan cannot be easily labeled as being beneficial or adverse, since that decision will vary with the perceptions of the individual concerned. In any case, the effect itself should be quantified and displayed for purposes of decisionmaking.

1. *Measurement standards.* Whether subjectively perceived or objectively measured, the criteria used to describe or evaluate the beneficial or adverse effects of a plan will vary—consistent with the relevant components of the environmental objective under consideration. To the extent possible, however, beneficial or adverse effects will be displayed in terms of relevant physical and ecological criteria or dimensions, including the appropriate qualitative dimensions. For example, where the effects of a plan will be visibly evident, quantitative, and qualitative descriptions may be made in terms of established or accepted water and land classification or ecological criteria and related measures.

Where significant physical effects are less easily perceived, it may be necessary to determine their extent through instrumentation or symptomatically by the presence or absence of commonly expected characteristics. As an example, eutrophication of fresh water lakes exemplifies a less easily perceived process that is reflected symptomatically, and which is subject to measurement by instrumentation with statistical analysis of data collected over time. Therefore, its rate of change is measured by reference to previous dates or periods, with projected rates of future change based on probability analysis. As explicit an account as possible of these effects and supporting analysis should be provided.

Notwithstanding the physical or ecological criteria terms available, certain environmental effects can be presented most effectively by reference to their qualitative dimensions. For instance, it may be necessary to use this approach to show the importance of a reduction in use or availability for use of areas of natural beauty, archeological, or historical significance. Consequently, the analysis should be supported by an appropriate descriptive-qualitative interpretation and evaluation of the effects of the plan on the relevant components of the environmental objective.

2. *With and without analysis.* Existing environmental conditions will be described and presented in terms that best characterize the planning perceptions and ecology of the affected area as conditions would exist without any plan. Similar descriptions will be prepared for the time sequence of the conditions to be expected with and without the plan throughout the period of analysis. The conditions before planning is initiated will provide the data from which to evaluate environmental effects—or prediction of change—under alternative proposals, including the consequence of failure to adopt a plan for development and use of resources in the area under study. It should be clear that environmental conditions will not remain static but will, in fact, tend to change over time regardless of whether a plan is adopted.

3. *Limitations.* It is not presently possible to anticipate or identify, much less measure, all environmental effects or change. Nor are there in existence evaluation standards that permit full and direct quantitative comparisons and ranking of the conditions of identifiable environmental effects that might be expected to result from a plan. Consequently, reasoned judgments by multidisciplinary teams will be required in many situations. When this is necessary, a frank expression of the state of knowledge and the limitations thereof, as well as the limitations of the analysis in each instance, is essential.

4. *Classes of environmental effects.* Environmental effects of plans toward the complex of conditions encompassed by the environmental objective are best understood and their significance interpreted by evaluating them as separable components of the overall objective. While these are stated in terms of beneficial effects, adverse effects should be read as the converse of each statement. Beneficial effects (and adverse effects) of plans as related to components of the environmental objective are classified and evaluated relevant to:

A. Beneficial effects resulting from the protection, enhancement, or creation of open and green space, wild and scenic rivers, lakes, beaches, shores, mountain and wilderness areas, estuaries, or other areas of natural beauty.

With regard to these kinds of resources, beneficial effects on this component of the environmental objective are evaluated on the basis of data such as follows, though these are not all inclusive:

1. *Open and green space.* These are essentially undeveloped, visually attractive natural areas strategically located where most needed to ameliorate intensifying urbanization patterns.

a. Size and measure:

(1) Total acreage (woods, fields, meadows, etc.):

(2) Pattern and distribution;

(3) Juxtaposition to community and urban areas (effect on urban sprawl).

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected open and green space.

c. Improvements: (1) Accessibility (mileage of public roads or trails provided; easements);

(2) Public amenities (provision for limited facilities, if any);

(3) Other (specify or describe).

d. Protection and preservation:

(1) Physical (fire, bioenvironmental, etc.);

(2) Legal (dedication, easements, institutional, etc.);

(3) Special.

2. *Wild and scenic rivers.* These are free-flowing streams, with shorelines or watershed essentially or largely undeveloped, which possess outstandingly remarkable scenic, recreational, geological, fish and wildlife, historic, cultural, and other features.

a. Size and measure, including characterization of adjacent primitive or near natural setting:

(1) Total mileage;

(2) White water mileage;

(3) Water quality;

(4) Character and extent or acreage of streamside land;

(5) Juxtaposition to community.

b. A descriptive-qualitative interpretation, including an evaluation of the

effects of a plan on the designated or affected wild or scenic river.

c. Improvements:

(1) Accessibility (trails, infrequent roads, or other minimum public access provided; easements);

(2) Public amenities (provision for limited facilities as boat launching, picnic areas, if any);

(3) Other (specify or describe).

d. Protection and preservation:

(1) Physical (bioenvironmental);

(2) Legal (dedication or withdrawal, institutional, water quality standards, etc.);

(3) Special.

3. *Lakes.* Where their clarity, color, scenic setting, or other characteristics are of special interest, aesthetically pleasing lake contribute to the quality of human experience.

a. Size and measure:

(1) Surface acreage;

(2) Shoreline mileage;

(3) Depths;

(4) Water quality.

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected lake or lakes.

c. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Drainage;

(3) Cleaning;

(4) Shoreline management, including public amenities

(5) Other (specify or describe).

d. Protection and preservation:

(1) Physical (bioenvironmental);

(2) Legal (institutional, pollution standards, etc.);

(3) Special.

4. *Beaches and shores.* The juxtaposition of attractive beaches, distinctive, scenic shorelines, and adjacent areas of clean offshore water provides positive public aesthetic values and recreational enjoyment.

a. Size and measure:

(1) Mileage;

(2) Acreage;

(3) Marshland acreage;

(4) Embayments.

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on designated or affected beaches and shores.

c. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Public amenities;

(3) Nourishment;

(4) Other (specify or describe).

d. Protection and preservation:

(1) Physical (jettys, bulkheads, etc.);

(2) Legal (dedication, institutional, etc.);

(3) Special.

5. *Mountains and wilderness areas.* Generally occurring at higher altitudes, these pristine areas of natural spendor and scientific interest embrace a very special category of land use. Such areas are designated for the purpose of preserving primeval conditions, as nearly as possible, for aesthetic enjoyment and for limited forms of recreation and other scientific uses.

a. Size and measure:

(1) Acreage;

(2) Biological diversity;

(3) Pattern and distribution;

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected mountain and wilderness area.

c. Improvements:

(1) Accessibility (limited public roads and trails);

(2) Public amenities (limited facilities provided, if any);

(3) Other (specify or describe).

d. Protection and preservation:

(1) Physical (fire, bioenvironmental, etc.);

(2) Legal (dedication, institutional, etc.);

(3) Special.

6. *Estuaries.* Beyond their critical importance in man's harvest of economically useful living marine resources, many estuaries, coves, and bays merit special consideration as visually attractive settings that support diverse life forms of aesthetic value and as marine ecosystems of special interest.

a. Size or measure:

(1) Surface acreage;

(2) Shoreline mileage;

(3) Marshland acreage and shoreline mileage;

(4) Water quality.

b. Biological significance as a nursery, breeding, and feeding ground (name species involved).

c. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected estuary.

d. Improvements:

(1) Accessibility;

(2) Public amenities (facilities provided, if any);

(3) Other (specify or describe).

e. Protection and preservation:

(1) Physical;

(2) Legal;

(3) Special.

7. *Other areas of natural beauty.* These include any other examples of nature's visual magnificance and scenic grandeur, not accommodated in the above-specified classes, which have special appeal to the aesthetic faculties of man.

a. Size or measure:

(1) Acreage;

(2) Mileage.

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on designated or affected areas of natural beauty.

c. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Screening;

(3) Plantings (seedlings, grassed cover, etc.);

(4) Public amenities (scenic overlooks, if any);

(5) Other (specify or describe).

d. Protection and preservation:

(1) Physical (fire, bioenvironmental, etc.);

(2) Legal;

(3) Special.

Conversely, and in a generally parallel manner, adverse effects of a plan result from the inundation, adverse alteration, or decreases in the availability, use, and aesthetic quality of these resources.

B. Beneficial effects resulting from the preservation or enhancement of especially valuable archeological, historical, biological, and geological resources and selected ecological systems.

Excluding ecological systems which are separately evaluated below, beneficial effects on this component of the environmental objective are evaluated on the basis of data such as follows, though these are not all inclusive:

1. *Archeological resources.* Preservation of these resources provides a continuing opportunity for studying the development of human settlements and understanding man's cultural heritage.

a. Size or measure:

(1) Acreage;

(2) Square footage;

(3) Height or depth from ground level.

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected archeological resource areas.

c. Educational:

(1) General education;

(2) Special and scientific.

d. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Interpretation and monumentation;

(3) Other (specify or describe).

e. Protection and preservation:

(1) Physical;

(2) Legal (dedication, other);

(3) Special.

2. *Historical resources.* Preservation of these resources provides for the study, understanding, and appreciation of the Nation's origins and the evolution of its institutions as well as its scientific and technical progress.

a. Size and measure:

(1) Acreage;

(2) Number of units (of whatever kind).

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected historical resource area.

c. Educational values:

(1) General education;

(2) Specialist.

d. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Availability (as appropriate to particular site or materials preserved);

(3) Interpretation and monumentation;

(4) Other (specify or describe).

e. Protection and preservation:

(1) Physical;

(2) Legal (dedication, other);

(3) Special.

3. *Biological resources.* The opportunity to observe and study biological resources—terrestrial and aquatic—leads

to an enlarged understanding and appreciation of the natural world as the habitat of man.

a. Size and measure (wide variation depending on characteristics of particular animal or plant):

(1) Total land and surface acreage and shoreline mileage:

(a) Land acreage (forest, woodland, grassland, etc.);

(b) Water surface acreage and shoreline mileage;

(c) Marshland acreage and shoreline mileage.

(2) Population estimates and characteristics of fish and wildlife to include as nearly as possible:

(a) Age and size classes;

(b) Sex ratios;

(c) Distribution (density).

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected biological resource or resources.

c. Educational:

(1) General;

(2) Special and scientific.

d. Improvements:

(1) Accessibility (public roads and trails; easements;

(2) Habitat enhancement or site improvement:

(a) Sanitation;

(b) Stabilization;

(c) Increasing edges;

(d) Harvesting (to maintain balance with environmental food supply);

(e) Cover planting (species, including number or acreage);

(f) Stocking:

(i) Wildlife (species and number);

(ii) Fish (species and number);

(3) Other (specify or describe):

e. Protection and preservation:

(1) Physical;

(2) Legal (dedication, other);

(3) Special.

4. *Geological resources.* When of outstanding geologic or geomorphologic significance, preservation of these resources contributes to man's knowledge and appreciation of his physical environment.

a. Size and measure:

(1) Surface acreage;

(2) Subsurface acreage (estimated);

(3) Quantity (estimated in appropriate units).

b. A descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the designated or affected geological resources.

c. Educational:

(1) General education;

(2) Special and scientific.

d. Improvements:

(1) Accessibility (public roads and trails; easements);

(2) Interpretation and monumentation;

(3) Other (specify and describe).

e. Protection and preservation:

(1) Physical;

(2) Legal (dedication, other);

(3) Special.

Conversely, and in a generally parallel manner, adverse effects result from the inundation, deterioration, or disruption of like kinds of resources.

5. *Ecological systems.* Apart from the contributions which use of the natural resource base makes to man's basic needs for food, shelter, clothing, and employment opportunities, covered elsewhere, the environmental objective embraces the concept and appreciation of the values inherent in preservation of ecological systems per se.

Each natural area, such as a watershed, a vegetation and soil type, a tidal salt marsh, a swamp, a lake, or a stream complex, represents an ecosystem, an interdependent physical and biotic environment that functions as a continuing dynamic unit, possessing not only intrinsic values but also contributing to the enrichment of the general quality of life in a variety of subtle ways. Conversely, when such natural areas are lost or otherwise diminished in size or quality, there are corresponding adverse environmental effects borne by society.

Beneficial effects resulting from preservation of ecological systems include:

1. The maintenance of a natural environment in a state of equilibrium as an intrinsic value to society;

2. The provision of the purest form of aesthetic contact with nature;

3. Contributions to the development, appreciation, and integration of a "land ethic" or environmental conscience as a part of man's culture; and

4. Scientific understanding derived from the preservation and study of natural ecological systems which contributes to the conservation of natural resources in general, the most important practical application of ecology.

Conversely, adverse effects are the reduction or loss of opportunity to society as a result of a plan.

C. Beneficial effects resulting from the enhancement of selected quality aspects of water, land, and air by control of pollution.

1. *Water quality.* The beneficial effects of water quality improvements will be reflected in increased value to water users and will be recorded under the national economic development or regional development objectives. For example, increases in the value of the Nation's output of goods and services from improvements in water quality will be accommodated under the national economic development objective. A great deal of improvement is needed in the methods of measuring these values.

There will be other water quality beneficial effects, however, that cannot be measured in monetary terms but are nonetheless of value to the Nation. Examples of such benefits are usually in the aesthetic and ecological areas so important to mankind. Beneficial effects from these kinds of improvements are contributions to the environmental objective and are identified, measured, and described in nonmonetary terms.

Beneficial effects to the environmental objective from water quality control may be defined in relation to the State standards established under the Water Quality Act of 1965. Reservoir storage and flow regulation for water quality may be utilized where it is the least-cost way of meeting these standards.

Consistent with water quality standards established for the affected planning area, water quality control beneficial effects are identified, measured, and described by methods and terms such as:

a. Physical and chemical tests including but not limited to:

(1) Dissolved oxygen;

(2) Dissolved solids;

(3) Temperature;

(4) Acidity/alkalinity;

(5) Nutrients.

b. Biological indicators including but not limited to:

(1) Coliform;

(2) Macro and micro organisms;

(3) Algae.

c. Description: By a descriptive-qualitative interpretation, including an evaluation of the effects of a plan on the aquatic community as a whole.

Conversely, adverse effects will be reflected as departures from the established water quality standards, including related damages, as a result of a plan.

2. *Air quality.* Air pollution is primarily a regional problem stemming principally from urban centers containing concentrations of people, industry, and transportation. In addition to its diverse social impacts, air pollution causes direct injury to natural environments, including ground cover, trees, and wildlife. In its purely physical dimensions, air pollution is accommodated within the environmental objective.

Beneficial effects to the environmental objective from air quality control may be defined in relation to regional air quality standards established under the Air Quality Act of 1967.

Consistent with air quality standards established for the affected planning area, air quality control beneficial effects are identified, measured, and described by:

a. The amount and use of open space between sources of air pollution and concentrations of people to assist in the process of atmospheric dispersion and dilution.

b. Reductions in the use of fossil fuels.

c. Reductions in damages to:

(1) Wildlife:

(a) Species;

(b) Number or density;

(c) Distribution;

(d) A descriptive-qualitative interpretation and evaluation of effects as appropriate.

(2) Ground cover:

(a) Species;

(b) Acreage and density;

(c) Distribution;

(d) A descriptive-qualitative interpretation and evaluation of effects as appropriate.

(3) Forests:

(a) Species or types;

(b) Acreage;

(c) Growth rates;

(d) Distribution;

(e) A descriptive-qualitative interpretation and evaluation of effects as appropriate.

d. Enhancement of possibilities for visual enjoyment and aesthetic appeal of natural settings and scenic landscapes.

Conversely, adverse effects will be reflected as departures from established air quality standards, including related damages, as a result of a plan.

3. *Land quality.* Where erosion is prevalent or spreading—largely because of inadequate land use planning and management—it, among other things, seriously detracts from the general use, appreciation, and enjoyment of terrestrial and aquatic environments.

As encompassed by the environmental objective, soil is valued as a basic national resource rather than for its more traditional role as a primary production factor contributing to inceases in national output.

Beneficial erosion control effects improving the visual attractiveness of the natural landscape include:

a. Reductions in sediment on beaches and public recreation areas;

b. Reductions in turbidity and sediment pollution of water in rivers, streams, and lakes;

c. Restoration of cull banks from strip mines and other eroded sites;

d. Bank stabilization on mainline and secondary roads.

Conversely, adverse effects will reflect any increases in sedimentation, bank sloughing, or other kinds of erosion resulting from a plan.

D. Beneficial effects resulting from the preservation of freedom of choice to future resource users by actions that minimize or avoid irreversible or irretrievable effects or, conversely, the adverse effects resulting from failure to take such actions.

While the previous discussion and outline of effects of the various components has been organized essenitally in terms of programs or actions affecting environmental conditions, it may also be useful to view environmental effects of a plan in broad categories emphazing the predominant considerations of each, whether aesthetic, ecological, or cultural. Following such a classification, aesthetic values in the environment generally encompass lakes, estuaries, beaches, shores, open and green space, wild and scenic rivers, wilderness areas, and other areas of natural beauty; ecological values in the environment generally embrace the physical quality of water, air, and land (erosion), biological resources, and interrelated ecological systems; and cultural values in the environment are generally accommodated by historical, archeological, and geological resources. As this system of classification is not mutually exclusive, however, it is possible for multiple public values to be reflected within each of the components.

E. BENEFICIAL AND ADVERSE EFFECTS ON THE REGIONAL DEVELOPMENT OBJECTIVE

Through its effects—both beneficial and adverse—on a region's income, employment, population, economic base, environment, social development, and other components of the regional development objective, a plan may exert a significant influence on the course and direction of regional development.

Given its broad and varied nature, the regional development objective embraces several types of goals and related classes of beneficial effects. These are (a) increased regional income; (b) increased regional employment; (c) population distribution; (d) diversification of the regional economic base; (e) enhancement of educational, cultural, and recreational opportunities; (f) enhancement of environmental conditions of special regional concern; and (g) other specified components of the regional development objective. Because of this variability, several approaches or methodologies are required for the measurement of effects on the regional development objective.

As a first step, the beneficial effects for achieving the regional development objective should be set forth in terms of the specified components of the objective affected by the plan. Where beneficial effects of accomplishing national economic development and environmental quality objectives are synonymous with specified components of the regional development objective, these beneficial effects to the regional development objective will be measured and evaluated in a manner consistent with that established for the national objectives. However, care must be exercised to include only that portion of the national beneficial effects that actually accrue within the region of concern.

The evaluation of various components of the regional development objective and related classes of beneficial and adverse effects is discussed below.

1. *Regional income*—a. *Beneficial effects.* The objective to increase regional income is attained to the extent that water resource investment, together with other complementary investments, increases output and provides additional regional income flows than would otherwise occur in the absence of the plan. Increases in regional output and related income are evaluated in a maner paralleling computation of net income to the various purposes—water supply, power, etc.—discussed under the national economic development objective. However, in evaluating these and other elements of the regional development objective, a distinction should be made between identifying and measuring benefits to specified components of the regional development objective of the designated region and other regional impacts which may occur incidentally. Where the regional development objective relates to increases in regional income, four classes of beneficial effects occur. These are:

(1) The value of increased output of goods and services from a plan to the users residing in the region under consideration;

(2) The value of output to users residing in the region under consideration resulting from external economies;

(3) The value of output in the region under consideration resulting from the use of resources otherwise unemployed or underemployed; and

(4) Additional net income accruing to the region under consideration from the construction or implementation of a plan and from other economic activities induced by operations of a plan.

b. *Adverse effects.* The adverse effects of a plan upon a particular region include the adverse effects on a region's income; employment; population distribution; economic base; educational, cultural, and recreational opportunities; environmental quality; or other components of the regional development objective.

Where the regional development objective relates to regional income, the regional adverse effects include:

(1) The value of resources contributed from within the region under consideration to achieve the outputs of a plan.

(2) Payment through taxes, assessments, or reimbursement by the region under consideration for resources contributed to the plan from outside the region;

(3) Losses in output resulting from external diseconomies to users residing in the region under consideration;

(4) Loss of assistance payments from sources outside the region to otherwise unemployed or underemployed resources and displaced resources residing in the region under consideration;

(5) Losses in output in the region under consideration resulting from resources displaced and subsequently unemployed; and

(6) Loss of net income in the region under consideration from other economic activities displaced by construction or operation of a plan.

c. *Regional incidence of national economic development.* Measurement of the beneficial and adverse effects of national economic development follows the same methods outlined under B and C above and is a matter of determining the geographic incidence of such beneficial and adverse effects in the regions under consideration and the rest of the Nation.

Special measurement techniques are needed for effects from use of unemployed resources and location effects.

d. *Measurement of output from use of unemployed or underemployed resources.* Increased output resulting from the utilization of resources that would be unemployed or underemployed in the absence of the plan is a third category of regional development beneficial effects.

Beneficial effects from the utilization of unemployed or underemployed resources may occur as a result of the plan through employment in construction and operation by direct users of the output of the plan or by firms that are economically related to the direct user.

Where the planning region has unemployed or underemployed resources and it can be shown that these resources will in fact be employed or more effectively employed as a result of the plan, the net additional payments to the unemployed or underemployed resources should be measured as a beneficial effect.

An important concept in identifying the presence of unemployed resource utilization benefits is the presumption that

generally full employment conditions will prevail throughout the economy over the relevant period of analysis.

Under a rigorous definition of full employment all resources are employed in their highest use, resources are generally mobile, and the economy is in general equilibrium. Under these conditions, many analysts have concluded water resource investments would not result in achieving additional beneficial effects from use of unemployed or underemployed resources, since in the absence of a water and land resource plan economic forces would continuously bring about readjustments toward full employment.

With respect to future development, the OBERS projection series, which is used as the economic baseline for evaluation of future needs for water resource development, makes the assumption that "The Government will implement the policies needed to maintain full employment under a free enterprise economy." Furthermore, implicit within the projections is the assumption that the levels of future development are predicated upon an orderly and reasonable development of water resources. The availability and use of these projections does not obviate the need on a case-by-case basis to properly interpret the full employment implications to determine the particular conditions where that assumption should be modified. Moreover, an area or regional economy must satisfy certain preconditions as a basis for clearly demonstrating the possibility of beneficial effects arising from the utilization of unemployed or underemployed resources. These conditions and the estimate of beneficial effects related thereto are stated below.

1. *Resource immobilities.* Otherwise unemployed or underemployed resources (labor, fixed capital, and natural resources) may be used or better employed as a result of the economic activities generated by a plan. For this condition to apply it must reasonably be demonstrated that in the absence of the water resource plan the unemployed or underemployed resources to be affected by the plan would remain immobile (would not be productively employed or employed in higher uses anywhere in the economy) over all or part of the period of analysis.

While recognizing that many resource immobilities tend to be of a long-run nature, there is a special class of resource immobilities that occur only periodically and for relatively short durations. They are usually associated with unusual weather or hydrologic conditions in terms of flooding, low flows, droughts, adverse drainage conditions, and the reliability of water supply.

In such situations, without a plan, losses in output result through the denial of access to business establishments, prevention of the processing and movement of supplies and products, losses in the values of public services, loss of opportunity for provision of personal services, and the like. To the extent that such losses cannot be compensated for by postponement of activity or through transfer of such activity to business establishments not affected, prevention of such loss is clearly identifiable as a contribution to regional development and is not offset by losses elsewhere in the economy. The proper measurement reflecting these short-term resource immobilities is the estimate of net incomes foregone or increased costs for provision of services without the plan occasioned by unusual and periodic conditions such as those listed above.

(2) *Other conditions and requirements.* A determination of the region or regions within which the major impact of unemployed resource utilization effects will take place as a result of the plan is required. It can generally be assumed that the major share of such effects will take place in relative close geographic proximity to the location of the direct users or beneficiaries of the goods and services resulting from the plan.

An analysis of the key economic factors within the affected region or regions is required and will be made as a basis for determining the likelihood that a chronic unemployment or underemployment situation will prevail in the future. The analysis should include the past performance, current situation, and projected situation. The most critical factors to be analyzed should include the following: (1) Labor force participation rates by age, sex, and race; (2) unemployment rates by age, sex, and race; and (3) average earnings of workers or product per man-hour.

The purpose of this analysis will be twofold. First, it will be necessary to have an accurate description of the unemployed and underemployed resources so they may be linked to possible beneficial effects of water and land resource plans. Second, it will be necessary to determine from the analysis the probable duration of the adverse employment situation (the immobility factor) in the absence of the plan. This latter analysis will require an evaluation of the source of unemployment or underemployment.

The above analyses should indicate whether they are unemployed or underemployed resources of significant dimensions and duration which can be employed through the water and land resource plan.

(3) *Measurement of beneficial effects of using unemployed resources.* Identifying and measuring beneficial effects of using unemployed or underemployed resources presents major difficulties at the present time. At the request of the Council, the Office of Business Economics and the Economic Research Service are engaged in studies of operational techniques for the identification and measurement of national and regional income effects resulting from water and land resource plans.

Each planning study should include an analysis of the problem. Planning reports will show whether the area to be influenced by the plan has an unemployment problem of significant magnitude and whether the plan under evaluation will make a positive contribution to reducing unemployment.

e. *Location effects.* Location or transfer effects of a plan can be beneficial or adverse depending on the region being considered. In any case, these effects are real and important to a region even though from the national view they sum to zero across all regions in the Nation. For this reason (as well as others), regional evaluations should proceed within the framework of a system of regional accounts.

Location effects are generally estimated as a multiplier factor of the more direct project outputs on the region being considered. Several alternative means of calculating such a multiplier value are available. They include input-output studies, economic base studies, and the application of Keynesian multiplier concepts to regions. Recent studies have indicated that all three approaches provide comparable values for the same region. The Water Resources Council will provide information on the appropriate multiplier values to use for specific planning studies.

2. *Regional employment.* Elimination or substantial reduction of high rates of unemployment—and related underemployment—in particular geographical areas and among particular segments of the population has long been a national concern, and a concern of affected regions. Water and land resource plans undertaken in designated areas characterized by significant economic and employment problems are generally harmonious with the regional development objective to increase employment per se. When this is the case—and under with and without analysis—beneficial effects are identified and measured as the increase in the number and types of jobs resulting from the plan.

To the extent possible, planning reports will provide reasonable estimates indicating the composition of the increased employment by the relevant service, trade, and industrial sectors, including a separate estimate for agriculture. The nature of the employment increase to each sector will be classified with regard to the level of skills required—unskilled, semiskilled, and highly skilled.

Where practicable, the estimates within each of the sectors will be further classified by other pertinent attributes to the projected employment mix, such as age classes, sex, average wages, and labor force participation rates.

Where the regional development objective relates to regional employment, adverse effects are any decrease in the numbers and types of jobs resulting from the development.

3. *Population distribution.* Contributions toward achieving specified goals for population dispersal and urban-rural balance through improved distribution of population and employment opportunities are included as beneficial effects.

Although the historic movement of the Nation toward urbanization has resulted in much social, cultural, technical,

and economic progress, the evidence of recent years suggests—at least for some areas—that the increasing social and economic costs attendant on attainment of high population densities in cities and suburbs are becoming unduly burdensome. The Nation is thus confronted with the task of channeling economic growth in new directions, while significantly reducing social and economic costs.

Maintaining the rural population base while drawing some people back into outlying areas with more opportunities for employment, recreation, more and better living space, and an amenable social environment respresents a responsive approach toward redirecting geographic distribution of the population while providing for economic growth and development.

Public investment programs, especially those embracing plans for water and land development and use, contribute toward this component of the regional development objective by providing the water and land supplies—in both quantity and quality—which are an essential prerequisite to creating new settlement opportunities or expanding upon existing rural developments and by assisting in the provision of better social services and improved cultural opportunities at reduced community costs.

These beneficial effects will occur when populations of affected planning areas are stabilized or otherwise increased through in-migrations resulting from implementation of a plan.

Beneficial effects to this component can be measured as the improvement or increase in population and related employment toward attainment of specified distributional goals.

Conversely, adverse effects are identified and measured as increases in the concentration of population and employment contrary to specified objectives.

4. *Regional economic base and stability.* The economic base of a region consists of those activities which provide the basic employment and income on which the rest of the regional economy depends.

For some regions the mix of the existing economic base may be too narrow and specialized, thus restricting the region's development potential. Over an extended period such a region is likely to be subject to extensive cyclical instability with attendant adverse economic and social consequences. When a region wishes to offset the likelihood of such cyclical instability over the long run, diversification of the economic base may be specified as a development objective.

Water and land resource plans contribute to this regional objective when they provide needed inputs—particularly water supply, power, and transportation—that contribute to or assist in creating the essential conditions that enable an improvement in the industrial mix over time leading to a broader production base by which the region can provide a larger portion of the Nation's outputs of goods and services.

When the region under study has too great a concentration or specialization in its economic base and the water and land resource plan being evaluated would have a significant effect in promoting greater diversity, the following information should be shown in planning reports: (1) A statistical description of the area's current economic base, highlighting the employment concentrations which are of concern; (2) projections of future employment both with and without the plan; and (3) the percentage reduction in the area's expected dependence on its specialized type of employment, with as compared to without the water plan. The latter statistic will be shown in tabular displays of plan benefits.

Beneficial effects to this component include contributions to (1) balanced local and regional economies; (2) regularizing market activity and employment fluctuations; (3) offsetting effects of climatic vagaries and accompanying uncertainty; and (4) reversal in decline of community growth.

These beneficial effects may be measured or described in a variety of ways, with primary emphasis on comparative indices relating to fluctuations in output, employment, and prices.

Conversely, adverse effects are identified and measured or described as negative effects on economic stability.

5. *Educational, cultural, and recreational opportunities.* Beneficial effects to this component include contributions to (1) improved opportunities for community services such as utilities, transportation, schools, and hospitals; and (2) more cultural and recreational opportunities such as historic and scientific sites, lakes and reservoirs, and recreation areas.

Beneficial effects to improved community services may be described in appropriate quantitative and qualitative terms, while increased cultural and recreational opportunities will be set forth as the numerical increase in the relevant facilities, otherwise accounting for size, use potential, and quality.

Conversely, adverse effects are identified and measured or described as detrimental effects on educational, cultural, and recreational opportunities.

6. *Environmental conditions of special regional concern.* Where their impact is likely to have special reference to a region's perception of its future development needs, the special concern of a region toward particular elements of the overall environmental quality objective may be given expression through specific incorporation in the regional development objective.

As discussed above, beneficial effects toward improving, preserving, or achieving one or more of the diverse and varied components of the environmental quality objective are identified and measured in a variety of physical dimensions, or otherwise qualitatively described. When such benefits are applicable to the regional development objective, they will be measured and evaluated in a manner consistent with that followed in the above referenced section.

F. EFFECTS ON SOCIAL FACTORS

In addition to their effects on the three objectives described above, most water and land resource plans have beneficial and adverse effects on social factors. These effects reflect a highly complex set of relationships and interactions between inputs and outputs of a plan and the social and cultural setting in which these are received and acted upon. These effects will be fully reported in the system of accounts for each alternative plan.

With emphasis on their incidence or occurrence, beneficial social effects are contributions to the equitable distribution of real income and employment and to other social opportunities. Since they are integrally related to the basic values and goals of society, these effects are usually not subject to monetary evaluation. The normal market exchange process, however, produces monetary values which can be utilized to aid in measuring the distributional impacts of plans on real income.

Adverse social effects of a plan have detrimental impacts on the equitable distribution of real income and employment or otherwise diminish or detract from the attainment of other social opportunities. Additionally, such adverse effects include not only those incurred in the designated planning area, but also include adverse consequences elsewhere in the Nation resulting from implementation of the plan.

1. *Measurement standards.* Criteria used to evaluate or describe the beneficial or adverse effects of a plan will vary with the relevant social factor under consideration. Where appraisal of such diverse social and economic characteristics as income distribution, health and safety conditions, and so forth, is relevant to a proper evaluation of a plan, the measurement standards to be applied must necessarily be broad and variable. Measures used to describe social effects may be expressed in dollars, other quantitative units, and qualitative terms.

2. *With and without analysis.* Existing conditions encompassed by the relevant social factors will be described and presented in terms that best characterize the planning perceptions and social setting of the affected area in the situation without the plan. Planners will also prepare similar descriptions for future social conditions to be expected with and without the plan throughout the period of analysis. The situation existing before the initiation of planning will provide the data from which to evaluate significant social effects under alternative plans.

3. *Limitations.* In evaluating social effects the obtaining of detailed breakdowns and analytically useful correlations relating to various indicators, index numbers, and similar comparative statistical indicators, as well as dollar values where possible, presents many complex definitional, data, and measurement problems. Consequently, planning studies should explicitly recognize the limitations of present methods and explore innovative approaches to the identification and measurement of the social effects. Such procedures should be carefully documented in the report.

4. *Classes of social effects.* Social effects of a plan are more clearly understood and their significance interpreted by evaluating them as separable classes of social effects. While these are stated

in terms of beneficial effects, adverse effects should be read as the converse of each statement. Beneficial effects (and adverse effects) of a plan include:

a. *Effects on real incomes.* Beneficial effects to this component occur when designated persons or groups receive income generated as a result of the plan.

The income distribution effect can be measured as the net amount of total and per capita income accruing to designated persons or groups.

Current guidelines or yardsticks defining the family poverty line may be used as the data from which to measure and portray the estimated absolute and percentage increase toward meeting or exceeding this standard for specific geographic planning areas.

Conversely, adverse effects are identified and measured as the reduced real income of such persons or groups due to taxes, reimbursement costs, and other adverse economic effects.

b. *Effects on security of life, health, and safety.* Beneficial effects to this component include contributions to (1) reducing risk of flood, drought, or other disaster affecting the security of life, health, and safety; (2) reducing the number of disease-carrying insects and related pathological factors; (3) reducing the concentration and exposure to water and air pollution; and (4) providing a year-round consumer choice of foods that contribute to the improvement of national nutrition.

In those limited situations where historical experience is sufficiently documented to provide confidence in projecting likely future hazards, an estimate of the number of lives saved or the number of persons affected may be provided. In most instances, however, a descriptive-qualitative interpretation and evaluation of the improvement and expected results will be applicable.

Conversely, adverse effects are identified and measured or described as increases in hazards to life, health, and safety.

c. *Effects on emergency preparedness.* Beneficial effects to this component include contributions to (1) extending, maintaining, and protecting major components of the national water transportation system; (2) provision of flexible reserves of water supplies; (3) provision of critical power supplies (ample, stable, quickly responsive); (4) provision of reserve food production potential; (5) provision for the conservation of scarce fuels; (6) provision for dispersal of population and industry; and (7) supplying international treaty requirements.

While these beneficial effects will be measured in appropriate quantitative units where readily practicable, they will be largely characterized in descriptive-qualitative terms.

Conversely, adverse effects are identified and measured or described as overloading capacities of water resource systems and increasing the risk of interruption in the flow of essential goods and services needed for special requirements of national security.

d. *Other.* The effects on other social factors may be identified and displayed as relevant to alternative plans.

IV. General Evaluation Standards

To assure consistency in the application of planning principles, uniform evaluation guides are necessary. The following general evaluation standards are to be used, to the extent applicable, in considering all objectives in planning of water and land resources. Deviation in the application of these evaluation standards and the reasons therefor should be fully reported.

A. General Setting

Plan formulation and evaluation shall be based upon national and regional projections of employment, output, and population and the amounts of goods and services that are likely to be required. The Water Resources Council has arranged for preparation and periodic revision of a set of national and regional economic projections as a guide to project, regional, and river basin planning. These projections reflect the Council's current views as to probable rates of growth in population, the gross national product, employment, productivity, and other factors. The projections also include expected rates of regional growth in relation to the level of projected national growth. The following table shows the selected national projections adopted by the Water Resources Council reflecting the expected rates of national growth. The Council may change these national projections by amending these standards.

Water Resources Council Projections Selected National Data Historical and Projected [1]

Year	Total population (census)	Population 14 and over (census)	Labor force participation rates (computed)	Labor force (BLS)	Civilian labor force (BLS)	Unemployment rate (BLS)	Civilian employment (BLS)
	Thousands	*Thousands*		*Thousands*	*Thousands*		*Thousands*
1950	152,271	113,438	0.571	64,749	63,099	.05314	59,746
1955	165,931	119,440	.577	68,896	65,847	.04412	62,942
1960	180,684	127,335	.574	73,126	70,612	.05567	66,681
1965	194,592	138,280	.567	78,358	75,665	.04569	72,179
1966	196,920	140,565	.570	80,164	77,041	.03863	74,065
1967	199,118	142,961	.575	82,170	78,724	.03958	75,608
1968	201,166	145,405	.576	83,687	80,152	.03671	77,210
Rate, 1950–68 (percent)	1.6	1.4	....	1.4	1.3	....	1.4
	Census C	*Census C*					
1980	235,212	174,234	.584	101,753	98,753	.04000	94,803
2000	307,803	227,470	.592	134,662	131,662	.04000	126,396
2020	400,053	295,029	.598	176,427	173,427	.04000	166,490
Rate, 1968–2020 (percent)	1.3	1.4	....	1.4	1.5	....	1.5

Year	Civilian government employment (BLS)	Civilian private employment (BLS)	Private economy hours per man-year (BLS)	Private economy product per man-hour (computed) (1958 dollars)	Private economy gross product (OBE) (1958 dollars)	Gross national product (OBE) (1958 dollars)	Total manpower civilian plus military (BLS)
	(Thousands)	*(Thousands)*			*(Millions)*	*(Millions)*	*(Thousands)*
1950	5,792	53,954	2,127	2.78	319,410	355,288	61,396
1955	6,805	56,137	2,091	3.34	392,007	437,963	65,991
1960	7,943	58,738	2,027	3.68	438,523	487,682	69,195
1965	9,623	62,556	2,020	4.43	559,808	617,799	74,902
1966	10,346	63,719	2,018	4.64	596,292	658,087	77,188
1967	11,183	64,425	1,996	4.74	609,100	674,628	79,054
1968	11,627	65,583	1,977	4.93	638,998	707,608	80,745
Rate, 1950–68, (percent)	3.9	1.1	−0.4	3.2	3.9	3.9	1.5
1980	15,514	79,289	1,918	7.03	1,069,096	1,153,873	97,803
2000	23,466	102,930	1,825	12.69	2,383,782	2,505,894	129,396
2020	34,572	131,918	1,736	22.92	5,248,901	5,423,135	169,490
Rate, 1968–2020, (percent)	2.1	1.4	−0.25	3.0	4.1	4.0	1.4

Year	Product per man (computed) (1958 dollars)	Product per capita (computed) (1958 dollars)	Total personal income (OBE) (1958 dollars)	Personal income per capita (OBE) (1958 dollars)	Domestic personal income (OBE) (1958 dollars)	Domestic earnings (OBE) (1958 dollars)	Domestic private earnings (OBE) (1958 dollars)
			Millions		*Millions*	*Millions*	*Millions*
1950	5,787	2,333	274,571	1,803	272,876	225,104	199,478
1955	6,637	2,639	335,010	2,019	332,183	277,596	240,925
1960	7,048	2,699	389,653	2,157	387,489	317,575	271,581
1965	8,248	3,175	495,306	2,545	492,600	396,969	344,068
1966	8,526	3,342	526,651	2,674	523,643	424,280	366,168
1967	8,534	3,388	550,196	2,763	546,899	440,239	366,923
1968	8,763	3,518	580,030	2,883	576,477	462,600	383,963
Rate, 1950–68 (percent)	2.3	2.3	4.2	2.6	4.2	4.1	3.7
1980	11,798	4,906	979,439	4,164	975,373	770,545	631,887
2000	19,366	8,141	2,280,156	7,245	2,222,627	1,722,563	1,376,826
2020	31,997	13,556	4,987,314	12,467	4,973,521	3,799,770	2,958,438
Rate, 1968–2020 (percent)	2.5	2.6	4.2	2.8	4.2	4.1	4.0

[1] The sources of the historical data are indicated in the column headings. The projections of population are from the Bureau of the Census. All other projections were prepared for the Council by the Office of Business Economics, Department of Commerce.

The projections presented here and elaborated in a separate Council publication may also serve as a convenient basis for preparing alternative projections for use in sensitivity analysis.

While a relatively high rate of employment has been assumed in national projections, it is recognized that chronic unemployment and underemployment are problems in many regions. The assumption of a high rate of employment nationally does not preclude consideration of the occurrence of short-run or cyclical fluctuations in the national economy or special analyses of regions with relatively low economic activity and high rates of unemployment.

Planning will also take account of national and State environmental and social standards such as water quality standards, air quality standards, or minimum health standards.

The Water Resources Council will, as necessary, designate areas where special consideration should be given to these values.

B. MEASUREMENT OF BENEFICIAL AND ADVERSE EFFECTS

In planning water and related land resources, beneficial and adverse effects of a proposed plan should be measured by comparing the estimated conditions with the plan with the conditions expected without the plan. Thus, in addition to projecting the beneficial and adverse effects expected with the plan in operation, it is necessary to project the conditions likely to occur in the absence of the plan. Since economic, social, and environmental conditions are dynamic, changes will occur without the plan in a variety of factors, including regional economic activity, rates of unemployment or underemployment, and environmental conditions. Consequently, only new or additional beneficial and adverse effects resulting from the proposed plan should be attributed to it.

C. PRICE RELATIONSHIPS

The prices of goods and services used for evaluation should reflect the real exchange values expected to prevail over the period of analysis. For this purpose, relative price relationships and the general level of prices for outputs and inputs prevailing during or immediately preceding the period of planning generally will be used as representing the price relationships expected over the life of the plan. Exceptions to the general rule will occur when the output or input of the plan affects prices, abnormal weather or other factors have temporarily affected prices, or governmental or other institutional arrangements have temporarily affected prices.

The Water Resources Council will publish periodically data on prices of agricultural and other goods and services that can be furnished efficiently for all planning activities. Included in these publications may be special analyses of price problems and simulated prices for recreation and other project outputs or effects for which market prices are not readily available.

D. THE DISCOUNT RATE

The discount rate will be established in accordance with the following concept:

The opportunity cost of all Federal investment activities, including water resource projects, is recognized to be the real rate of return on non-Federal investments. The best approximation to the conceptually correct rate is the average rate of return on private investment in physical assets, including all specific taxes on capital or the earnings of capital and excluding the rate of general inflation, weighted by the proportion of private investment in each major sector.

The difference between the interest rate paid on Federal borrowings and the opportunity cost rate in the private sector is due in part to the fact that private rates of return must be sufficient to pay taxes on earnings of capital. When investments are made by the Federal Government, these tax revenues are foregone. Use of the opportunity cost rate in evaluating Federal investments is necessary therefore to achieve equity from the standpoint of the Federal taxpayer who must finance Federal investments. The Federal Government should not displace funds in the private sector unless its return on investment is equal to or larger than that in the private sector.

1. *The opportunity cost of government investment.* Abstracting from income distribution considerations, the total value of the Nation's resources is maximized by expanding or contracting any specific activity to a level such that the marginal value of resources in that activity is equal to their marginal value in other feasible uses. Alternatively, the marginal value of resources in any activity is equated with the marginal cost of that activity, where cost represents the highest value foregone use of those resources in alternative activities. This general principle also applies to the Federal Government. For given total Federal outlays, the net benefit generated by the Federal Government is maximized by expanding or contracting individual Federal activities to a level for which the marginal value of resources is equal to the marginal cost of resources in all activities. If all Federal activities involved only a single time period, the prices of resources purchased by the Federal Government (including any specific excise taxes or subsidies to which other institutions are subject), would be a sufficient basis for estimating the cost of Federal activities. For those Federal activities that involve a distribution of costs over time, however, some estimate of the marginal value of resources in present uses relative to their value in future uses is necessary to estimate the cost of government activities, and this value is reflected by the selection of an appropriate interest rate for evaluating Federal investment activities. For any given Federal budget, the net benefit generated by the Government is maximized only if the marginal rate of return on all Federal activities is equal. However, the net benefit generated by Government is maximized only when the marginal rate of return on Federal investments is equal to the marginal rate of return on investments by other institutions in this Nation. Only this second condition assures a maximization of the net benefits of the Nation's investment activities and the appropriate division of investment activities between the Federal Government and other institutions.

The establishment of an interest rate for evaluation of Government investments is derived from this second condition. Once this rate is determined, individual Government investment activities should be expanded or contracted to a level such that the marginal rate of return equals this rate. The conceptually correct rate for Federal investments, assuming that the non-Federal sector will allocate additional investment funds among alternative uses in roughly the same manner as the present distribution, is the average of the marginal real rates of return in each part of the non-Federal sector, weighted by the proportion of present investment in each part.

2. *Estimating the discount rate for Government investments.* Estimating the appropriate real interest rate for Federal investments involves several problems: First, the critical assumption must be made that the different observed rates of return within the non-Federal sector represent equilibrium differences (reflecting different risks, taxes, and subsidies) or that the Federal Government does not systematically channel resources into a specific part of the non-Federal sector in its investment activities. If the Federal Government could effectively channel resources into those parts of the non-Federal sector with the highest rates of return, the opportunity cost of Federal investments would be higher than the average of the marginal returns. Second, there are conceptual difficulties in estimating the marginal rate of return on investments in State and local governments, and no comprehensive estimate of this rate has been made. Third, the available data provide a basis for estimating only the average rate of return in the private sector. If the average rate of return is constant (as a function of the level of investment), this is not a problem as the average and marginal rates are equal and, in the long run, this appears to be a good approximation. In the short run, the rate of return on private investment displaced by additional government investment is probably higher than the average rate.

The best approximation to the conceptually correct rate that can be made is the average of the average rates of return on private investment, weighted by the proportion of investment in different parts of the private sector. This rate has been calculated in J. A. Stockfisch, "Measuring the Opportunity Cost of Government Investment," Institute for Defense Analyses, P-490, March 1969. Stockfisch first estimates the average rate of return on physical assets (exclusive of cash holdings), including the specific (corporate and property) taxes on capital, for the period from the Korean war

to the Viet Nam war. He then weights these average rates by the proportion of investment in the different parts of the private sector during the later part of this period. Finally, he reduces this aggregate average rate by the average rate of inflation in the longer period. The resulting estimate of the real average rate of return in the private sector is 10.4 percent; for this concept, this estimation procedure is probably accurate within a ±1 percent range. Recognizing the two conceptual problems discussed above, inclusion of the rate of return on State and local government investments would somewhat lower this rate and a reduction in non-Federal investment displaced by additional Federal investment would lead to a marginal rate somewhat above the average. On net, it appears that the average of the marginal returns on physical investment in the non-Federal sector is around 10 percent, and additional evidence also suggests that the marginal return on investment in education is approximately equal to the rate of return on physical investment.

Moreover, there is strong reason to believe that the real rate of return in the non-Federal sector has been roughly constant over the entire period since the Korean war. The structural conditions that determine this rate are the long-run investment prospects in the U.S. economy and the levels of taxes on capital or the earnings on capital. The long-run investment prospects appear to be roughly constant. Although the corporate income tax has been reduced slightly since the Korean war, property taxes have been increased by a roughly equal magnitude. A significant redistribution of investment activities within the non-Federal sector would also change the average of the rates of return, but this has not been observed. This suggests that a frequent recalculation of the Stockfisch estimate need not be made unless there is evidence of a significant change in these structural conditions.

It is important to recognize that the stability of the real rate of return in the non-Federal sector is not inconsistent with the observed variance of the rates on marketed debt instruments. Changes in the yields on Government bonds and other debt instruments primarily reflect conditions—such as changes in the anticipated inflation, monetary policy, and the distribution between equity and debt financing—that are unrelated to the real rate of return on investment.

In summary, the conceptual and empirical issues are not fully resolved. The above discussion, however, suggests that the appropriate rate for evaluating Government investment decisions is approximately 10 percent and is substantially invariant to short-term changes in economic and money market conditions.

3. *Selection of a specific rate for water resource projects.* The revealed preferences of the Federal political process clearly indicate a desire to transfer income to the people in specific regions by subsidizing water resource projects. In the past, these subsidies have been implemented in several ways but most importantly by the use of an interest rate to evaluate these projects that is lower than that for alternative Federal and non-Federal investments. Accepting the legitimacy of the political process in determining income transfers and subsidies, the use of a low interest rate, unfortunately, is often an inefficient instrument for these purposes because it also biases the design of these projects toward those with higher near-term costs and lower near-term benefits.

Recognizing both the objectives of subsidizing water resource projects and the objective of an efficient combination among and between Federal and non-Federal investment activities, a 7-percent rate will be used for evaluating water resource projects during the next 5 years. Use of a 7-percent rate will facilitate implementation of one of the basic purpose of multiple objectives planning by allowing more comparable consideration of environmental quality objectives. Less capital intensive projects, scaled mainly to meet near-term needs, will result in relatively more efficient use of Federal and non-Federal investment toward meeting increasing critical water needs, given current budgetary constraints.

It is sometimes argued that the discount rate to be used in evaluating Federal investment opportunities should be based on the cost of Federal borrowing (the cost of money to the Treasury). It should be noted that, properly calculated, the cost of Federal borrowing includes not only the yield rate on Treasury obligations but also tax revenues foregone on returns to private borrowing displaced by Federal borrowing, commissions paid on sales of bonds, and administrative costs of borrowing. After the yield rate, the most significant of these is foregone tax revenues.

The fulll cost of Federal long-term borrowing, for generally prevailing economic considerations, is at least 7 percent and can be as high as 10 percent. The exact figure depends on how much tax revenue is foregone. This, in turn, depends on the distribution of income from foregone investment among corporations, individuals, and State/local governments.

Thus, the 7-percent rate established above, approaches both the opportunity cost and the total cost of Federal borrowing.

E. CONSIDERATION AND COMPARISON OF ALTERNATIVES

A range of possible alternatives to meet needs and problems, including types of measures and alternatives capable of application by various levels of government and by nongovernmental interests, should be studied. These alternatives should be evaluated or judged as to their contribution to the multiobjectives.

Plans, or increments thereto, will not be recommended for Federal development that, although they have positive contributions to the multiobjectives, would physically or economically preclude alternative non-Federal plans which would likely be undertaken in the absence of the Federal plan and which would more effectively contribute to the multiobjectives when comparably evaluated according to the principles.

The alternative non-Federal plan that would likely be physically displaced or economically precluded with development of the Federal plan, or increments thereto, will be evaluated for purposes of this determination on a comparable basis with the proposed Federal plan with respect to their beneficial and adverse effects on the multiobjectives, including the treatment of national economic development effects and the discount rate used in the evaluation. Taxes foregone on the proposed Federal plan and taxes paid on the non-Federal alternative will be excluded in such comparisons for the evaluation of the national economic development objective.

F. PERIOD OF ANALYSIS

The period of analysis will be the lesser of: (1) The period of time over which the plan will serve a useful purpose considering probable technological trends affecting various alternatives; or (2) the period of time when further discounting of beneficial and adverse effects will have no appreciable result on design. Where pertinent, however, appropriate consideration will be given to long-term environmental factors which may extend beyond periods significant for analysis of effects for national or regional economic development.

Salvage value remaining at the end of the period of analysis should be taken into account for income-producing features of the plan.

For the environmental objectives, the goal may be to achieve a level of environmental quality during or at the end of the period of analysis and to maintain this level into the indefinite future.

One hundred years will normally be considered the upper limit of the period of analysis, and shorter periods will be used whenever appropriate for any of the considerations described above.

G. SCHEDULING

Plans should be scheduled for implementation in relation to needs so that desired multiobjective beneficial effects are achieved effectively. Beneficial and adverse effects occurring according to different patterns in time, are affected differently by the discount process when plans are scheduled for implementation at alternative future times. Therefore, plan formulation should analyze the alternative schedules of implementation to identify the schedule that would result in the most desirable mix of contributions to the multiobjectives when the beneficial and adverse effects of a plan are appropriately discounted.

While beneficial and adverse effects toward the multiobjectives will accrue over different time frames for the alternative implementation schedules, the discontinued equivalent of such beneficial and adverse effects to be considered

in the comparison of the alternative implementation schedules should represent the present value of the beneficial and adverse effects toward the multiobjectives for each alternative implementation schedule at a common point in time.

H. RISK AND UNCERTAINTY

Since future events cannot be predicted with certainty, beneficial and adverse effects actually realized in the future may differ from the values expected of them at the present. In some cases, the range of variation can be anticipated and the sensitivity of proposed plans or projects to future contingencies can be evaluated.

Risk may be characterized as being reasonably predictable, since bases are available to calculate the probability or frequency of losses associated with its occurrence. For example, average losses from fires, storms, pests, and diseases can be estimated with reasonable assurance. Thus, the value attached to risk may be converted into a reasonably certain annual allowance. The net returns of a project should exclude all predictable risk, either by deducting the allowance therefor from the beneficial effects or adding such allowance to the project costs. The basis for making a risk allowance in estimating the beneficial and adverse effects of a program or project should be clearly stated.

Uncertainty is characterized by the absence of a basis for predicting the probability of occurrences. Uncertainties may result in estimating beneficial and adverse effects from such factors as fluctuations in the levels of economic activity, technological changes or innovations, and unforeseeable developments. Allowances for uncertainties must be based largely upon judgment, since information is not available for calculating a value. The nature of the uncertainty thought to surround beneficial and adverse effects should be discussed in planning reports, and specific strategies, such as flexibility in project designs, recommended to cope with it. In addition, sensitivity analysis may be employed to analyze uncertain situations.

I. SENSITIVITY ANALYSIS

Planning organizations should examine the sensitivity of plans to data availability and to key items for which alternative assumptions might be appropriate. Examples of such items include prices; discount rates; and economic, demographic, and technological trends. Selected alternative projects and assumptions that are likely and that, if realized, would appreciably affect plan design or scheduling should be analyzed.

J. UPDATING PLANS

Because of rapid change in social, economic, technologic, physical, and other factors, a plan for a project prepared under these standards that is not implemented wihin 10 years after completion should be reviewed to ascertain whether it continues to be the best alternative to achieve the multiobjectives.

Plans for regions and river basins prepared under these Standards will be continually updated as implementing actions are considered. In addition, such plans should be completely reviewed at least every 20 years.

V. PLAN FORMULATION

A. INTRODUCTION

As set forth in principles, the formulation of plans will be directed to meeting current and projected needs and problems as identified by the desires of people in such a manner that improved contributions are made to society's preferences for national economic development and environmental quality and where approved in advance for regional development.

1. *Major steps in plan formulation.* Plan formulation is a series of steps starting with the identification of needs and problems and culminating in a recommended plan of action. The process involves an orderly and systematic approach to making determinations and decisions at each step so that the interested public and decisionmakers in the planning organization can be fully aware of the basic assumptions employed, the data and information analyzed, the reasons and rationales used, and the full range of implications of each alternative plan of action. This process should be described in enough detail in the report of the study so that it may be replicated by others.

The plan formulation process consists of the following major steps:

1. Specify components of the multiobjectives relevant to the planning setting;

2. Evaluate resource capabilities and expected conditions without any plan;

3. Formulate alternative plans to achieve varying levels of contributions to the specified components of the multiobjectives;

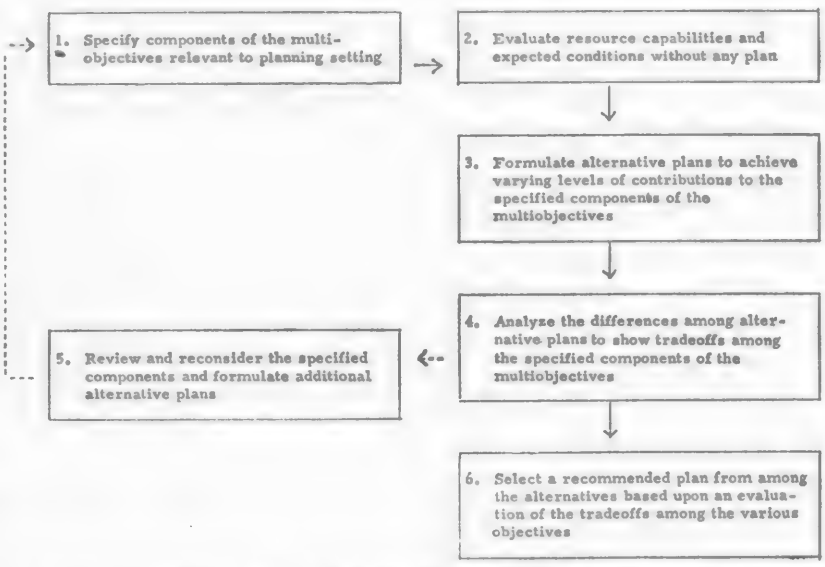
4. Analyze the differences among alternative plans to show tradeoffs among the specified components of the multiobjectives;

5. Review and reconsider, if necessary, the specified components for the planning setting and formulate additional alternative plans as appropriate; and

6. Select a recommended plan from among the alternatives based upon an evaluation of the tradeoffs among the various objectives.

In the subsequent parts of this section each of these steps is described in more detail. The major steps involved in this process are shown schematically at the end of this subsection. It should be noted that the plan formulation process described herein is not just a once-through process but may be reiterated several times, with each reiteration being somewhat more detailed than the previous one. The plan formulation process must be tailored to fit a given planning situation and the detail and depth of analysis will necessarily vary with each level of planning.

THE PLANNING PROCESS


1. Specify components of the multi-objectives relevant to planning setting
2. Evaluate resource capabilities and expected conditions without any plan
3. Formulate alternative plans to achieve varying levels of contributions to the specified components of the multiobjectives
4. Analyze the differences among alternative plans to show tradeoffs among the specified components of the multiobjectives
5. Review and reconsider the specified components and formulate additional alternative plans
6. Select a recommended plan from among the alternatives based upon an evaluation of the tradeoffs among the various objectives

2. *Levels of planning.* The standards for plan formulation apply to the preparation of framework studies and assessments, regional or river basin studies, and implementing studies. The important differences in the application of these plan formulation standards to different levels of planning are the relevant component needs, the level of detail with respect to beneficial and adverse effects in the decision process, and the types of alternative courses of action that are considered.

a. Framework studies and assessments. Framework studies and assessments will evaluate or appraise on a

broad basis the needs and desires of people for the conservation, development, and utilization of water and land resources; will identify regions or basins with complex problems which require more detailed investigations and analysis; and may recommend specific implementation plans and programs in areas not requiring further study. They will consider Federal, State, and local means and will be multiobjective in nature.

Framework studies and assessments of major regions are designed to: (1) Determine the extent of water and land problems and needs; (2) indicate the general approaches that appear appropriate for their solution; and (3) identify specific geographic areas where regional, river basin, or implementation planning studies are needed. For framework studies and assessments, the information to be assembled should be consistent with the level of detail as outlined in guidelines for framework studies and assessments to be issued by the Water Resources Council. The framework studies and assessment should identify the complementarities and conflicts among components of the multiobjectives. Alternative courses of action will be considered for each of the specified subbasins. Framework studies and assessments usually do not provide a basis for recommending specific action for water resource development. However, comparisons should be made between alternative courses of action to indicate potential complementarities and conflicts that may exist as relative emphasis is shifted from one objective to another. This information will provide a basis for a decision as to which areas require more detailed regional, river basin, or implementation studies.

b. Regional or river basin studies. Regional or river basin studies are reconnaissance-level evalution of water and land resources for a selected area. They are prepared to resolve complex long-range problems identified by framework studies and assessments and will vary widely in scope and detail; will focus on middle term (15 to 25 years) needs and desires; will involve Federal, State, and local interests in plan formulation; and will identify and recommend action plans and programs to be pursued by individual Federal, State, and local entities.

Regional or river basin planning studies are concerned with a broad array of component needs of multiobjectives. Alternate plans will consider effects on many components of multiobjectives, and the analysis of tradeoffs among alternatives will be quite complex. Scheduling for implementation of the various elements of the recommended plan will be presented to indicate how each element relates to projected needs and the urgency and priority associated with meeting the needs.

The identification of the more urgent elements of the plan that require early action will guide subsequent implementation studies.

c. Implementation studies. Implementation studies are program or project feasibility studies generally undertaken by a single Federal, State, or local entity for the purpose of authorization or initiation of plans. These studies are conducted to implement findings, conclusions, and recommendations of framework studies and assessments and regional or river basin studies.

Plan formulation for implementation studies will focus on the preparation of a recommended plan of action to follow in the next 10 to 15 years. Long-range projections of the need for and use of water and land resources will be considered, however, primary attention should be directed toward the formulation of a plan to meet near-term needs and alleviate problems. Such plans will be oriented toward an identified set of specific components of multiobjectives for the planning area. The complexity of the plan formulation process will depend on the extent of the needs and problems in the area and the variety of planning functions that may be employed to meet the needs. In some cases, the array of competent needs to consider may be large. Other implementation studies may be oriented toward a single objective and, hence, will be concerned with only a few needs and alternatives. In either case, the multiobjective planning standards will be applied.

B. SPECIFICATION OF COMPONENTS

At the outset and throughout the planning process the specific components of the multiobjectives that are significantly related to the use and management of the resources in the planning setting must be ascertained and identified. These will be expressed in terms of needs and problems in the context of multiobjectives.

The term "specific component of the multiobjectives" refers to the desired achievement of types of goods, services, environmental conditions, or regional developments that are being sought as contributions to the multiobjectives. These components can be considered and expressed in terms of units of the effects desired. The term "component needs" as used herein refers to the type, quantity, and quality of desired beneficial effects. The components of the regional development objective are to be considered in plan formulation in a particular planning activity only with advance approval.

Reference should be made to the definition and description of objectives and benefits presented in sections II and III as the basis to determine the full range of components of multiobjectives, only a few of which are presented in this section as examples to illustrate the plan formulation process.

1. *National economic development.* For the national economic development objective, the components will usually be expressed at two levels.

The first level directly relates to the objective in the sense of the specification of the actual outputs of goods and services desired. Hence, the first level of specified components of this objective will generally be depicted in terms of increased outputs of goods and services or their more efficient production such as the following:

1. Increased or more efficient output of food and fiber;
2. Increased or more efficient output of recreational services;
3. Increased or more efficient production of energy;
4. Increased or more efficient production of transportation services;
5. Increased productivity of land for residential, agricultural, commercial, and industrial activities;
6. Increased or more efficient production of necessary public services such as municipal and domestic water supply; and
7. Increased or more efficient industrial output.

The second level of specification of the components of the national economic development objective follows from the translation of the first level specification of needs for goods and services into specific needs for water and land resources. In the context of the above, the second level specification of components would be established in terms such as the following:

1. Water and land for irrigation;
2. Water and land related recreation opportunities in terms of user days;
3. Hydroelectric power needs;
4. Inland navigation or deep draft harbor needs;
5. Provision of flood-free land or provision of stabilized lands;
6. Water supplies for municipal and domestic use; and
7. Water supply for industrial use.

The above examples are not intended to exhaust either the wide variety of outputs of goods and services that can become specific components or the total range of specific water and land needs into which the first level of components is translated. The major point is that to determine the specific components of the national economic development objective, it will usually be necessary to approach the problem, first, at the general level of the types of national outputs of goods and services and then translate these into specific water and land needs or problems.

It should further be noted that the specification of components of the national economic development objective at either level should always be stated in terms of outputs (which are the beneficial effects of a plan), but never in terms of the inputs to a plan. This also holds true in the specification of the components of the other objectives as well.

2. *Environmental quality.* The components of the environmental quality objective may be directly expressed as the achievement of specific environmental conditions such as the following:

1. Miles of scenic river of specified characteristics;
2. Acres of ecological areas of specified type preserved or enhanced;
3. Reach of river meeting specified water quality standards; and
4. Number of open space areas of specified type.

3. *Regional development.* The specified components of the regional development objective are identified from the regional point of view. Thus, early consideration must be given to the delineation of the region or regions.

A single delineation of a planning region may not be satisfactory for the purpose of examining hydrologic problems, economic and demographic pressures on resource use, and political considerations of plan implementation. To resolve this difficulty two types of regions may be utilized: (1) Formulation regions for the identification of component needs for resource use and physical resource problems; and (2) an evaluation region for use in evaluating the beneficial and adverse effects of alternative plans.

Formulation regions will be used to determine the component needs in the general planning area and to identify limitations and constraints to water and land resource use. These regions will vary in their geographic coverage, depending on which component need is being considered. For example, a recreation service area will depend on the extent and distribution of population as it may affect the water and land resources under study and may not be identical with the hydrologic area. Similarly, an electric power market area will likely encompass a larger geographic area than the hydrologic area or the power needs may be supplied from one or more hydrologic areas. In cases where the commodity or service need, such as agricultural commodities, metals, or services, can be supplied from a large number of hydrologic areas, interregional projections should be used to determine the probable level of the total need to be met from the planning area.

Formulation regions for physical problems may be based on hydrologic considerations and should be sufficiently large to include the identification and measurement of all significant effects of proposed actions. For example, a formulation region for a flood control problem should extend downstream from the probable location of a reservoir to include the measurement of significant reductions in flood damages. Similarly, the full hydrologic area of the basin or subbasin should be included to identify the full range of water and related land problems and their potential solutions.

The evaluation region consists of the geographic area for which a plan for the use and management of water and related land resources is to be designed. This region should be large enough to encompass all areas that will be physically affected by the plan, and include contiguous economic areas which may be significantly affected by the plan. The plan evaluation region will thus include one or more economic accounting areas as specified in section VI. The total consequences of the plan will be shown in national economic development, environmental quality, and social accounts, indicating the beneficial and adverse effects that accrue both within the plan evaluation region and to the rest of the Nation. All beneficial and adverse effects that accrue within the plan evaluation region and in the rest of the Nation will be identified in the system of regional development accounts.

If the plan evaluation region is composed of two or more States, the portion of the plan relating to each State should be shown separately.

4. *Participation.* The actual derivation and identification of components require several different approaches. An initial point of departure is the national and regional economic analyses and projections provided by OBERS. These will be useful in a first-cut definition of the economic parameters of the components of the multiobjectives. More detailed definitions will require in-depth consultation with Federal, State, and local officials familiar with the planning setting. Direct input from the public involved at the local and regional level is paramount in view of multiobjectives and should be pursued vigorously through appropriate means of public hearings, public meetings, information programs, citizens committees, etc.

Definition and specification of the components of the environmental quality objective will require direct consultation with groups identified with environmental concerns as well as with those groups within a planning setting whose actions have significant impacts on the environment. Similarly, for the regional development objective, consultation will be needed with established regional development organizations. A broad spectrum of groups and interests must be considered and consulted in the identification of the components.

5. *Projected Conditions.* The components of the multiobjectives will be drawn for both current and future conditions. Projections should be made for selected years over a specified planning period to indicate how changes in population and economic conditions are likely to impact on the components over time.

Economic and demographic projections should be consistent with national baseline projections (OBERS projections) which reflect differential regional growth patterns and probable future population and economic conditions of all regions of the Nation. Additional projections which reflect a regional point of view and which are required for identification of components of the regional development objective should also be made. Such projections, however, should be made on a comparable basis with the OBERS projections to enable valid comparisons to be made between alternative national and regional plans based on these different projections. Because demands for commodities and services are a function of price, the future needs are also affected by price. Therefore, the assumptions relating to prices used to determine the future needs must be stated.

Environmental needs of the future should be identified in terms of specific features of the natural environment of the area that will assure a continuance of sources with limitations alleviated or a healthful, scenic, and aesthetically satisfying experience to all citizens. For instance, unique archeological, historical, and biological features of the area that are desired for preservation for future generations should be identified. Desired environmental conditions for the future should be explicitly stated. These environmental component needs should reflect not only current preferences but should attempt to reflect the preferences likely to prevail in the future.

6. *Sensitivity tests.* In view of the uncertainty, with respect to both economic and demographic change as well as the uncertainty of future preferences for the components of the environmental objective, it will be necessary in projecting the needs associated with these components to show alternative levels in the future as the basis for testing the sensitivity of alternative plans when evaluated against different levels of needs for a given component in the future.

7. *Preferences.* The specification of the components of the multiobjectives must reflect the specific effects that are desired by groups and individuals of the planning area as well as the specific components declared to be in the national interest by the Congress or by the executive branch through the Water Resources Council. In this way the components of multiobjectives will reflect local, State, and national preferences and priorities as well as the extent of complementarity and conflict among components.

In this regard, the identification and detailing of the components of the multiobjectives should be viewed as the process of making explicit the range of preferences and desires of those affected by resource development in terms of reference that can form the basis for the formulation of plans. Rather than a single level of achievement being set forth for any specified component, a range of possible levels should be set forth so that the relevant preferences can be seen for a given component. It should be anticipated that the initial specification of components will be modified (expanded or reduced) during subsequent steps in plan formulation to reflect the capability of alternative plans to satisfy component needs and to reflect technical, legislative, or administrative constraints.

C. EVALUATION OF RESOURCE CAPABILITIES

In very broad terms, the first step of specification of the components of multiobjectives can be viewed as establishing the boundaries of demand (needs or problems) in the context of each objective. In the next step, evaluation of resource capabilities, the initial evaluation is made of the supply (availability) of the resources that can be employed to satisfy the current and future levels of demand.

Resources of the planning area shall be evaluated in terms of their ability to meet the current and projected needs identified for each component under two sets of conditions: (1) Capability of resources without any planned action; and (2) capability of water and land reproductivity enhanced through management plans. An analysis of the capability of resources to meet the projected needs without any planned action will reveal

the extent and magnitude of unsatisfied component needs and indicate the requirement for some specific plan of action to assure their satisfaction. To the extent that the water and land resources without any planned action are unable to meet current and projected needs or to the extent that resource managament enables the needs to be met more efficiently, there is an evident justification for formulating alternative plans.

In this formulation step, the first task is to undertake a selective inventory of the quantity and characteristics of water and land resources of the planning area and an appraisal of opportunities for further use of these resources. Problems limiting the use of resources should also be identified.

The resources inventory should include data on all physical factors appropriate to the investigation. Examples of the type of information needed include:

1. Hydrologic data such as rainfall and runoff characteristics, frequencies of high and low flows, availability of groundwater, natural lakes, marshes, and estuaries;

2. Water quality data, including dissolved oxygen temperature, turbidity, and mineralization;

3. Geology and topography of the planning area;

4. Land capability and use classifications;

5. Archeological, historical, cultural, scenic, or unique areas;

6. Biological resources; and

7. Current and planned water uses.

Based on an analysis of the inventory, the next step requires that an appraisal be made of the capability of the resources to support further use for the component needs. This would provide guidance as to the possible scope and magnitude of plans to meet the needs for each component. This appraisal would require identification of possibilities for management, development, and other opportunities for action such as:

1. Reservoir sites cataloged as to possible ranges of storage capacities;

2. Preservation of scenic streams;

3. Stream channel improvement possibilities;

4. Land treatment and enhancement measures;

5. Preservation or enhancement of fish and wildlife; and

6. Preservation or enhancement of a cultural or archeological area.

These possibilities for management, development, or other actions will indicate the resources capabilities relative to specific commodities, services, or environmental amenities desired by society. By proper selection of these development possibilities, plans may be formulated to meet the needs for each component of the objectives.

Problems likely to present impediments to the attainment of the desired levels of national or regional output of goods and services, environmental amenities, or social opportunities for the planning period should be identified Problems may take the form of physical constraints that limit resource use, conflicts in resource use, legislation that inhibits desired use or development, or other limitations.

At this point, it should be possible to generally outline the total development and resource use programs that are needed to meet current and projected needs for each component of the multiobjectives. An examination of these potential programs may reveal conflicts and complementarities among them. In addition, other programs may also be available. These may include such alternatives as changes in production processes for increased efficiency, meeting needs by shifting demand to other areas, or encouraging more rapid rates of technological progress.

D. FORMULATION OF ALTERNATIVE PLANS

In the first two steps in the plan formulation process, the components of the multiobjectives were specified in terms of needs and problems, the resource capability within the planning areas were evaluated, and the broad outlines of management, development, and other actions were identified. The next step is to undertake the actual design and scaling of alternative plans.

Ideally, in the presence of a situation where there are few or no constraints on planning and where the components of the multiobjectives are essentially complementary (the satisfaction of one component need does not preclude the satisfaction of the other component needs), the formulation of a single plan would be sufficient. The only test required would be that the plan was the most efficient plan to satisfy the specified level of component needs. Although in only a few instances will this situation occur, the case does help to establish the guidelines and criteria to judge the range of alternative plans that should be formulated and the tests to be applied in formulating any given plan.

The requirement for the formulation of alternative plans in the presence of multiobjectives derives from the basic characteristics of the multiobjective approach. First, instead of the component needs of all objectives being complementary, it is more likely they will be in conflict—the satisfaction of one will reduce the satisfaction of others. Second, given uncertainty with respect to future economic and demographic changes and the general uncertainty with respect to future preferences for the environmental quality objective, a single specified level of achievement or need satisfaction for any given component is not likely to be acceptable through time. Other factors contributing to the necessity for formulation of alternative plans include limited resources, technical planning constraints, and legal and administrative constraints.

Suggestions as to the determination of the general nature and types of alternative plans which should be formulated and the number of alternatives which should be developed within each general type are given below.

A first requirement is to determine the general types of alternatives to be developed under alternative assumptions concerning the level and magnitude of component needs in the future. Given alternative assumptions concerning future economic and demographic trends for the planning setting and the total range of component needs related thereto, a set of alternative plans should be prepared for each major assumption concerning the future. In those planning situations where there does not exist a strong linkage between water and land development and major shifts in economic and demographic trends, the OBERS baseline projections will generally be used as a single set of assumptions about the future level of component needs required. Where the linkage is sufficiently strong so that water and land development may materially alter future economic or demographic trends, this relation should be reflected in alternative assumptions. Where the planning area may be unusually susceptible to other factors that could easily change in the future, it will be appropriate to establish a basis for a different set of alternative plans based on alternative assumptions concerning future change. In this instance, a sensitivity check should be made to ascertain the extent to which component needs will vary significantly given different assumptions concerning the future. If no significant variation is found, only one set of alternative plans will have to be developed.

Within a given set of assumptions concerning future change and the component needs associated thereto, the number and types of alternative plans to be developed will be determined by applying the following:

1. On a first approximation basis, array component needs that are essentially complementary—that is, the satisfaction of one of these component needs does not preclude satisfaction of the other component needs or does not result in materially adding to the cost of satisfying the other component needs in the array; and

2. From the above approximation, it should be possible to group component needs and the elements of a plan to satisfy those needs that are essentially in harmony, each set representing the nucleus for an alternative plan.

At this step, relevant alternative means of meeting each of the component needs to be included in an alternative plan should be identified. All relevant means should be considered. An analysis should be made for each alternative means, including an identification of the beneficial and adverse consequences to other component needs. The assembly of information on alternative means of meeting the component needs will provide a basis for selecting the most effective means, or combination of means, of satisfying all component needs. The significance of this step is threefold: (1) It provides information on the effectiveness of alternative means of satisfying a component need; (2) it provides information on the extent of complementarity or conflict among component needs in relation to a particular means; and (3) it provides a basis for selecting alternative means for satisfying a component need in the formulation of an alternative plan.

At this point, it should be possible to formulate alternative plans built upon

the set of complementary component needs and plan elements. These essentially are the building blocks for the formulation of alternative plans. In formulating a given alternative plan, initial consideration will be given to its orientation toward fulfilling the component needs for one of the multiobjectives. Further additions should be made for the component needs of other multiobjectives, provided that their addition to a given plan does not significantly diminish the contributions of the overall plan to that multiobjective toward which the plan is oriented. An analysis of the alternative plan, in terms of beneficial and adverse effects, will reveal the extent of any shortfalls against other multiobjectives. The process is then repeated until sufficient numbers of alternative plans have been formulated so that there is at least one plan that generally satisfies each specified component need of the multiobjectives. This does not mean that there must be a plan for each multiobjective that excludes plan elements that significantly contribute to the component needs of other multiobjectives nor does it mean that a given alternative plan cannot appropriately satisfy the component needs of several multiobjectives. Additional alternative plans may be required where there are possible conflicts among the component needs within a given multiobjective.

A precise number of alternative plans cannot be specified in advance but will be governed by the relevancy of the multiobjectives to a given planning setting, the extent of component needs and their complementarity, the available alternative means, and the overall resource capabilities of the area under study.

To facilitate comparisons and tradeoffs among alternative plans and comparisons of beneficial and adverse effects measured in nonmonetary terms with beneficial and adverse effects measured in monetary terms, one alternative plan should be formulated in which optimum contributions are made to the component needs of the national economic development objective. Additionally, during the planning process at least one alternative plan will be formulated which emphasizes the contribution to the environmental quality objective. Other alternative plans reflecting significant tradeoffs among the national economic development and environmental quality objectives may be formulated so as not to overlook a best overall plan.

Alternative plans emphasizing contributions to specified components of the regional development objective will be prepared only with advance approval.

In formulating alternative plans, tests of acceptability, effectiveness, efficiency, and completeness should be applied.

The acceptability test refers to the workability and viability of the plan in the sense of acceptance of the public and compatibility within known institutional constraints.

The effectiveness test refers to technical performance of the plan and the level of contribution to the components of the multiobjectives.

The efficiency test requires that among all acceptable alternatives, Federal and non-Federal, water and nonwater, structural or nonstructural, the given alternative plan should be the least costly considering all adverse effects to the multiobjectives when comparably evaluated according to these standards.

The completeness test requires that a given alternative plan provide and account for all necessary investments or other actions that will be needed to assure the full realization of the contributions provided by the plan to the components of multiobjectives specified for the planning area. This may require relating the water and land resources plan to other types of public or private plans where they are crucial to the full realization of the contributions to the multiobjectives. The rule to follow is that beneficial and adverse effects must be treated comparably when relating water and land resource plans to other plans.

In formulating alternative plans to satisfy the component needs of the environmental quality objective, consideration may be given to an alternative which explicitly precludes any significant forms of physical construction or development. Where such a "no development" alternative is considered, it must be recognized that positive action is nonetheless required to assure that the "no development" concept can be realized and, further, that the particular environmental characteristics that it is desired to maintain or enhance through the "no development" alternative may change through time as a result of changing conditions within a planning setting. Positive actions, such as zoning or public land acquisition, may be necessary to accomplish the "no development" alternative. The test of plan completeness must be very carefully applied for this type of alternative plan.

E. ANALYSIS OF ALTERNATIVE PLANS

In the previous formulation step, a series of alternative plans were formulated and their beneficial and adverse effects evaluated and measured in accordance with the definitions and measurement standards set forth in section III of these standards. A display of the beneficial and adverse effects will be developed for each alternative plan in a form similar to that shown and discussed in section VI, System of Accounts.

In this formulation step, an analysis and comparison of alternative plans is outlined to make the following determinations:

1. The effectiveness of given alternative plans in meeting the component needs of the multiobjectives;

2. The differences among alternative plans in terms of their contributions to the multiobjectives and their effects on social factors; and

3. The relative value of those beneficial and adverse effects that are essentially presented in nonmonetary terms, in terms of what is given up or traded off among plans with varying degrees of contributions to the multiobjectives.

These determinations are essential to the subsequent step for selection from among the alternatives of a recommended plan.

The first determination involves the analysis of how well each alternative plan performs against the component needs that served as the basis for its formulation. The analysis should include an appraisal of any shortfalls against component needs for which the plan was formulated and the extent of shortfall against other component needs. For instance, if a given alternative has been formulated with emphasis on the component needs for the national economic development objective, the analysis should indicate the performance of the plan in terms of those needs and further indicate the degree to which the component needs for the other multiobjectives have been fulfilled or remain unmet. For this purpose, measures of performance should be developed that characterize how a particular plan performs against the component needs of the multiobjectives.

The second determination involves the systematic comparison of the performance of given alternatives with each other. The purpose for these comparisons is to portray the extent of difference among alternative plans as a basis for reducing the number of alternative plans to be considered in the selection of a recommended plan. The comparisons should be carried out to display the type of information on beneficial and adverse effects shown in section VI.

These comparisons will facilitate the evaluation of the significance of the differences among alternative plans. While all alternative plans will tend to differ, the degree and extent of difference is critical in reducing the number of alternative plans to be seriously considered for recommendation.

The third determination involves a special analysis designed to provide an approximation of relative monetary values to those effects to multiobjectives that are generally characterized and displayed in nonmonetary terms. It is not the purpose of the analysis, however, to convert such effects to monetary equivalents but to gain an insight with respect to the relative value of such effects by understanding their impact upon monetary values which, as a practical matter, is a generally understood common denominator for decisionmakers.

This analysis involves extracting information from the previous evaluation involved in comparison of plans. For the purposes of the special analysis, the alternative plan that optimizes the national economic development objective is compared with the alternative plans that emphasize the environmental quality or regional development objectives. Enhancement of environmental quality, for example, can be related to beneficial effects foregone or increased adverse effects in national economic developement. Likewise, an increase in national economic development can be compared with adverse effects on environmental quality or regional development. From this analysis, it should be possible to develop an array of relative values for the nonmonetary effects.

While not designed to provide a basis for conversion of nonmonetary beneficial and adverse effects to monetary terms, this analysis does provide the range of

monetary tradeoffs involved for the nonmonetary effects for a particular planning setting and will serve to point out that any final evaluation of the worth of nonmonetary effects must be seen in the context of the alternative way of using a particular resource.

F. RECONSIDERATION OF COMPONENTS AND ALTERNATIVE PLANS

As indicated in the introduction to this section, plan formulation should be viewed as a continuous process that must be reiterated during the overall planning process based upon the results of the initial consideration of plan formulation described above. Further, it should be noted that the level of analysis probably should not be detailed until the results of the initial or subsequent reiterations more clearly indicate the relevancy of the components of multiobjectives to the planning setting and the range and number of alternatives that should be considered as the basis for selecting a recommended plan. It should be stressed, with respect to alternative plans, that in the last formulation step, the selection of a recommended plan, only alternatives that could be favorably recommended for various mixes of the components of the multiobjectives will be considered.

The basis for reiteration of the plan formulation process at this point or for modifying certain steps in that process should be based upon the following considerations:

1. Level of detail inadequate as basis for selection of a recommended plan;

2. Alternatives considered result in significant shortfalls in meeting the component needs of one or more of the multiobjectives;

3. Resource capability and alternatives considered suggest that the initial specification of component needs was in error and requires modification;

4. Public policy changes occurring during the planning study suggest change in emphasis for the multiobjectives; and

5. Additional information obtained on resource capabilities or the technical aspects of alternative plans.

The above considerations are only suggestive of the conditions requiring reappraisal and reiteration of the plan formulation process. As a general guide, however, in determining the extent and number of reiterations that should be undertaken, a judgment must be made as to whether or not new information, further detail, or other change in the conditions listed above are likely to result in either significant changes in the component needs or in the alternatives considered.

G. PLAN SELECTION

The culmination of the plan formulation process is the selection of a recommended plan from among the alternative plans. Based upon the analysis of alternative plans and the results of reiterations of the plan formulation process, a set of alternative plans should be developed—each one of which, given the relevant mix of multiobjectives, could be selected on its own merits as a recommended plan or recommended course of action. It is from among these alternatives that a recommended plan will be selected.

The previous formulation steps should effectively screen the number and types of alternatives that are to be considered as candidates for a recommended plan. In general, these alternatives should possess the following characteristics:

1. For the given set of component needs, each alternative plan should be most efficient means to achieve those needs.

2. The plans should be significantly differentiated from each other, primarily in terms of emphasis on multiobjectives; that is, each alternative plan makes a unique contribution to one or more multiobjectives not provided for by any of the other alternatives under consideration. Using the analysis of alternatives, those alternatives that may have been formulated with essentially similar characteristics in terms of component needs with only minor differences should be screened to select the alternative that provides the best mix of contributions to the specific set of component needs.

3. Without regard to assigning priorities or weights to the component needs of a particular alternative to differentiate such alternative in terms of the other alternatives, each alternative must be "justified" in the sense that in the judgment of the planning organization the total beneficial effects (monetary and nonmonetary) to the objectives relevant to the alternative are equal to or exceed the total adverse effects (monetary and nonmonetary) to those objectives.

Given the above screening process, the choice of a recommended plan from among the remaining alternatives is essentially a choice governed by a reasonable and rational perception of priorities and preferences about the mix of multiobjectives. It is not a choice predicated upon an analysis of the most justified plan, since each alternative to be considered at this step of the overall formulation process can be justified on its own merits in terms of its contributions to the given mix of multiobjectives relevant to each alternative.

If explicit priorities or weights were assigned to the beneficial and adverse effects to each component need of the multiobjectives, it would be possible to select a best plan to be recommended with a minimum of judgment. In most cases, however, such priorities or weights will not be available and, as set forth in Principles, selection of a recommended plan will be based upon an appraisal so that the beneficial and adverse effects to the mix of objectives, to the best of current understanding and knowledge, reflect the priorities and preferences expressed by the public at all levels to be affected by the plan.

The basis of selection will be fully reported upon indicating all considerations made in the selection process.

An explicit presentation will be shown of the comparisons and resulting tradeoffs of the recommended plan to other alternative plans considered for recommendation. This will be shown in accordance with the system of accounts in section VI.

VI. SYSTEM OF ACCOUNTS

The system of accounts is an information system that displays beneficial and adverse effects of each plan on the multiobjectives and on social factors and provides a basis for comparing alternative plans. The display of beneficial and adverse effects on each objective and on social factors will be prepared in such manner that the different levels of achievement to each objective and effects on social factors can be readily discerned and compared, indicating the tradeoffs between alternative plans.

The system of accounts calls attention to the important aspects of information which must be generated and displayed if the decisionmaking process is to be effective. The evaluation framework through the system of accounts provides for a systematic investigation of the full range and extent of effects of a plan and provides for a display of this information in a format which is clear and useful to all participants in the decision process.

Four accounts will be used for displaying beneficial and adverse effects on each objective and on social factors and for showing and analyzing the tradeoffs among plans. The four accounts to be used are national economic development, environmental quality, regional development, and an account for social factors.

Two series of displays will be prepared. In the first, gross beneficial and gross adverse effects and net beneficial effects where appropriate will be displayed for each objective and on social factors in an account for each alternative plan. The second series of displays will be used to provide a ready comparison of the alternative plans.

In the first series of displays, beneficial and adverse effects to be shown in each account will be in accordance with the definition and discussions of beneficial and adverse effects by components of the objectives and on social factors contained in section III. Values for the national economic development account will be expressed in monetary units; values for the environmental quality account will be expressed in appropriate quantitative units or qualitative terms; and the regional development account and account for social factors will include a combination of monetary units and other appropriate quantitative units or qualitative terms. Tables 1, 2, 3, 4, and 5 illustrate the nature and the content of the first series of displays.

Table 1 is a schematic diagram of the system of accounts and illustrates the basis for summarizing beneficial and adverse effects on objectives and on social factors. Table 1 indexes the detailed display of beneficial and adverse effects by components in tables 2, 3, 4, and 5. The components of the national economic development account appear in table 2. The components of the environmental quality account appear in table 3. The components of the regional development account appear in table 4. The components of the account for social factors appear in table 5. The tables include hypothetical data on beneficial and adverse effects as examples only. These should not be considered necessarily inclusive

as to specification of components or coverage.

For the purposes of accounting for the regional development objective, the standard set of economic accounting areas designated on the attached map will be used. The Council will maintain a set of economic projections for these economic accounting areas and a capacity to provide additional analysis for planning studies on request. The economic area projections will be compatible with the Council's projections of national growth.

A plan may have effects on one or more of the economic accounting areas. As many economic accounting areas as necessary will be included in order to cover the geographic area relevant to the evaluation of the regional development objective. The effects of a plan upon the individual economic accounting areas comprising this geographic area should be identified in the planning report in order to take account of the plan in subsequent evaluations of problems and needs.

The system of accounts will also display the beneficial and adverse effects for the geographic area relevant to the evaluation of the regional development objective in relation to the other parts of the Nation. The number of economic accounting areas to be used will vary, dependent on the information available and the extent of the effects of the plan. It is not proposed that the effects of a plan be identified across all of the individual economic accounting areas shown on the attached map. The evaluation will, however, as a minimum, analyze the effects of a plan upon the geographic area relevant to the evaluation of the regional development objective and the rest of the Nation. If a plan results in substantial effects upon other regions of the Nation, the regions should be identified and the effects evaluated.

The incidence of national economic development adverse and beneficial effects across the system of regional accounts must sum to the total national economic development adverse and beneficial effects evaluated for the plan. The incidence of locational effects, both beneficial and adverse, across the system of regional accounts must sum to zero for beneficial effects and must sum to zero for adverse effects. In cases when an effect category includes both national economic development effects and locational effects, the sum of the effects for that category across the system of regional accounts will equal the total national economic development effects included in the category.

Beneficial and adverse effects on the regional development objective arising from the use of resources otherwise unemployed or underemployed and from resources displaced and subsequently unemployed represent special categories of effects in the regional development account. The incidence of these effects, both beneficial and adverse, across the system of regional accounts does not sum to zero for each category but will sum to the total value of such effects for each category evaluated for all regions identified.

The use of the standard set of economic accounting areas will not, however, rule out the use of other regions such as hydrologic regions or States whose delineations are important in measuring beneficial or adverse effects on specified components of the regional development objective. However, in such cases, the evaluation should also include an analysis of the effects of a plan utilizing the standard set of economic accounting areas.

Table 4 shows information for region 1, region 2, and the rest of the Nation to illustrate that the system of regional accounts is to show the major incidence of the plan and the relation to the rest of the Nation.

The second series of displays (table 6) will be used to provide a ready comparison of alternative plans. Each of the alternative plans will be paired with the recommended plan so that the advantages and disadvantages of each can be compared. Other comparisons between alternative plans may be displayed where relevant. The information needed for this second series of displays will be taken from the first series. The information should be summarized and condensed to make it as brief and yet as meaningful as possible. Differences between the recommended plan and alternatives should be set forth in a consistent manner so that positive and negative differences in beneficial and adverse effects are readily discernible. Table 6 illustrates the nature and content of this series of displays.

Economic Accounting Areas
(East)

Economic Accounting Areas
(Central)

Economic Accounting Areas
(West).

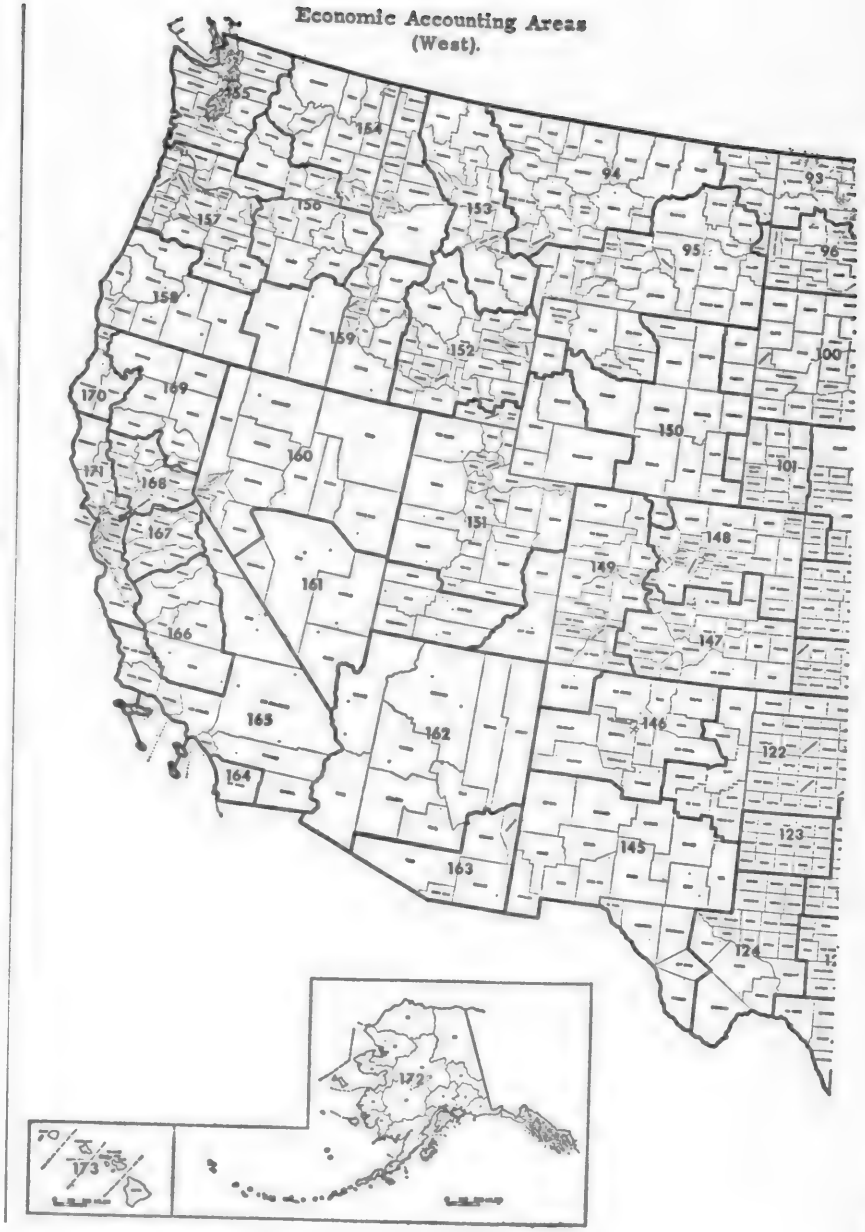


TABLE 1.—SCHEMATIC DIAGRAM OF SYSTEM OF ACCOUNTS

Account	*Beneficial and adverse effects*
National economic development.	(See table 2 for example display of effects by component.)
Environmental quality.	(See table 3 for example display of effects by component.)
Regional development.	(See table 4 for example display of effects by component.)
Region 1.	
Region 2.	
Rest of Nation.	
Social factors	(See table 5 for example display of effects by component.)

TABLE 2.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN (USE ADDITIONAL TABLES FOR EACH ALTERNATIVE PLAN)

NATIONAL ECONOMIC DEVELOPMENT

Components	*Measures of effects*
Beneficial effects:	
A. The value to users of increased outputs of goods and services. Examples include:	
(1) Flood control	$1,000,000
(2) Power	1,000,000
(3) Water supply	1,000,000
(4) Irrigation	1,000,000
(5) Recreation	1,000,000
B. The value of output resulting from external economies. Examples include:	
(1) Economies of scale in subsequent processing	1,000,000
(2) Reduced transportation costs as result of road relocation	1,000,000
Total beneficial effects	7,000,000
Adverse effects:	
A. The value of resources required for a plan. Examples include:	
(1) Project construction and OM&R	3,000,000
(2) Project pumping power	1,000,000
B. Losses in output resulting from external diseconomies. Examples include:	
(1) Diseconomies of scale in subsequent processing for displaced activities	1,000,000
(2) Increased transportation costs as result of road relocation	1,000,000
Total adverse effects	6,000,000
Net beneficial effects	1,000,000

TABLE 3.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN (USE ADDITIONAL TABLES FOR EACH ALTERNATIVE PLAN)

ENVIRONMENTAL QUALITY

Components	*Measures of effects*
Beneficial and adverse effects:	
A. Open and green space, wild and scenic rivers, lakes, beaches, shores, mountains and wilderness areas, estuaries, and other areas of natural beauty.	Examples include: 1. Create lake with 3,500 surface acres, 70 miles of shoreline, and depth of 80 feet, with high quality water and excellent access. 2. Create 600 acres of open and green space along creek, 1,000 to 1,500 feet wide, with good access and located 4 miles from city. 3. Inundate 3,500 acres of open and green space, 10 miles long and ½-mile wide, located along stream and near city.
B. Archeological, historical, biological, and geological resources and selected ecological systems.	Examples include: 1. Preserve recognized historical archeological feature and enhance access to feature. 2. Enhance wildlife habitat by acquisition of 500 acres mixed forest, pastureland; construction of three small ponds with 50 surface acres expected to maintain duck and pheasant population of 5,000 and 10,000 birds, respectively. 3. Disrupt 3,000 acres of wildlife habitat due to interior access roads and adjacent picnicking and camping sites, with possible decrease in deer, pheasant, and duck population.
C. The quality of water, land, and air resources.	Examples include: 1. Meet State water quality standards over 200 miles of stream below reservoir. 2. Enhance esthetic appeal of lands adjacent to reservoir by selected clearing and enhance visual enjoyment by unique design and location of access roads. 3. Prevent erosion by provision of 500 acres of grassed waterways and implementation of crop rotation practices on 5,000 acres of land. 4. Increase salt concentration over 50 miles of stream from X p.p.m. to Y p.p.m. due to salt load in return flows. 5. Increase erosion over 2,000 acres due to access road borrow pits and denuded recreation sites as a result of expected concentrated use; silt load downstream of reservoir estimated to increase X tons per year.
D. Irreversible commitments of resources to future uses.	Examples include: 1. Preserve low cost reservoir site by recommending development of well field for municipal water supply at slightly greater cost to the national economic development objective. 2. Reservoir is to be located at site with some unique species of plants and wilderness qualities due to limited access but which is a very efficient reservoir site.

TABLE 4.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN
(USE ADDITIONAL TABLES FOR EACH ALTERNATIVE PLAN)

Regional Development

Components	Measures of effects		
	Region 1 (Project area)	Region 2 (Adjacent area)	Rest of Nation
A. Income:			
Beneficial effects:			
a. The value of increased outputs of goods and services from a plan to the users residing in the region under consideration. Examples include:			
Flood control	$400,000	$300,000	$300,000
Power	500,000	500,000	0
Water supply	1,000,000	0	0
Irrigation	500,000	500,000	0
Recreation	400,000	300,000	300,000
b. The value of output to users residing in the region under consideration resulting from external economies. Examples include:			
Economies of scale in subsequent processing.	500,000	500,000	0
Reduced transportation costs as result of road relocation.	1,000,000	0	0
c. The value of output in the region under consideration resulting from the use of resources otherwise unemployed or underemployed. Examples include:			
Employment for project construction and OM&R.	1,000,000	0	0
Employment in activities induced by and stemming from project operation.	500,000	500,000	0
d. Additional net income accruing to the region under consideration from the construction or implementation of a plan and from other economic activities induced by operations of a plan. Examples include:			
Expenditures by imported construction workers and subsequent net regional income impacts.	+1,000,000	0	−1,000,000
Expenditures by imported recreationists and subsequent net regional income impacts.	+500,000	+500,000	−1,000,000
Total beneficial effects	7,300,000	3,100,000	−1,400,000

TABLE 4.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN—Continued

Components	Measures of effects		
	Region 1 (Project area)	Region 2 (Adjacent area)	Rest of Nation
Adverse effects:			
a. The value of resources contributed from within the region under consideration to achieve the outputs of a plan. Examples include:			
Lands, easements, rights-of-way	500,000	0	0
General taxes	250,000	250,000	1,000,000
b. Payment through taxes, assessments, or reimbursement by the region under consideration for resources contributed to the plan from outside the region. Examples include:			
Power reimbursement	250,000	250,000	0
Water supply reimbursement	500,000	0	0
Irrigation repayment	250,000	250,000	0
Ad valorem taxes	500,000	0	0
c. Losses in output resulting from external diseconomies to users residing in the region under consideration. Examples include:			
Diseconomies of scale in subsequent processing for displaced activities.	0	500,000	500,000
Increased transportation costs as a result of road relocations.	0	1,000,000	0
d. Loss of assistance payments from sources outside the region to otherwise unemployed or underemployed resources and displaced resources residing in the region under consideration. Examples include:			
Loss of State unemployment compensation:			
(a) Employment for project construction by OM&R.	+500,000	0	−500,000
(b) Employment in activities induced by and stemming from project operation.	+250,000	+250,000	−500,000
(c) Induced unemployment in displaced activities.	−250,000	−250,000	+500,000
e. Losses in output in the region under consideration resulting from resources displaced and subsequently unemployed. An example is:			
Induced unemployment in displaced activities.	500,000	500,000	0
f. Loss of net income in the region under consideration from other economic activities displaced by construction or operation of a plan. An example is:			
Loss of net income in displaced activities induced by and stemming from agricultural operations inundated by project.	+500,000	+500,000	−1,000,000
Total adverse effects	3,750,000	3,250,000	0
Net beneficial effects	3,550,000	−150,000	−1,400,000

TABLE 4.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN—Continued

Components	Measures of effects		
	Region 1 (Project area)	Region 2 (Adjacent area)	Rest of Nation
B. Employment:			
Beneficial effects:			
Increases in the number and types of jobs resulting from a plan in the region under consideration. Examples include:			
Employment for project construction	200 semiskilled jobs for 4 years	100 semiskilled jobs for 4 years	−200 semiskilled jobs for 4 years
Employment for project OM&R	50 permanent semiskilled jobs	5 permanent semiskilled jobs	−5 permanent semiskilled jobs
Employment in service and trade activities induced by and stemming from project operation.	900 permanent semiskilled jobs	95 permanent semiskilled jobs	−45 permanent semiskilled jobs
Total beneficial effects	200 semiskilled jobs for 4 years. 950 permanent semiskilled jobs.	100 semiskilled jobs for 4 years. 100 permanent semiskilled jobs.	−200 semiskilled jobs for 4 years. −50 permanent semiskilled jobs.
Adverse effects:			
Decreases in the numbers and types of jobs resulting from a plan in the region under consideration. An example is:			
Employment in displaced activities induced by and stemming from agricultural operations inundated by project.	50 permanent semiskilled jobs.	.....	−50 permanent semiskilled jobs.
Net beneficial effects	200 semiskilled jobs for 4 years. 900 permanent semiskilled jobs.	100 semiskilled jobs for 4 years. 100 permanent semiskilled jobs.	−200 semiskilled jobs for 4 years.
C. Population distribution			
Beneficial and adverse effects:			
Population distribution within the region under consideration and among regions in the Nation.	Examples include:		
	1. Create 1,000 permanent jobs supporting a population of 3,500 people in a region which historically has had a high rate of out migration.	.....	−500 permanent jobs and populaton of 1,750 peiople.
	2.....	Induced traffic as result of reduced transportation costs estimated to increase production of steel by x tons, involving y employment and z population in city which is highly industrialized presently.	−y permanent jobs and z population.

TABLE 4.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN—Continued

Components	Measures of effects		
	Region 1 (Project area)	Region 2 (Adjacent area)	Rest of Nation
D. Regional economic base and stability:			
Beneficial and adverse effects:			
Economic base and economic stability of the region under consideration.	Examples include:		
	1. Create 500 permanent jobs in a new industry offering high income stable year-around employment resulting in diversification of employment base.	Create 100 permanent jobs in a new industry offering high income stable year-around employment resulting in diversification of employment base.	−100 permanent jobs.
	2. Create 100 permanent jobs in concentrated industry with seasonal employment.	−75 permanent jobs...	−25 permanent jobs.
E. Educational, cultural, and recreational opportunities:			
Beneficial and adverse effects:			
Educational, cultural, and recreational opportunities in the region under consideration.	Examples include:		
	1. Create diversity of recreational opportunity by provision of (a), 10,000 man-days boating; (b) 5,000 man-days fishing; and (c) 20,000 man-days picnicking.	Reduce excessive use of recreation facilities on peak days and thereby improving aesthetic quality of recreation experience at existing facilities.	
	2. Influx of 500 construction workers will place severe burden on educational facilities over 4-year construction period.	.....	
F. Environmental conditions of special regional concern:			
Beneficial and adverse effects:			
The quality of water resources	Examples include:		
	1. Meet State water quality standards over 50 miles of stream below reservoir.	Meet State water quality standards over 100 miles of stream beginning 50 miles below reservoir.	Meet State water quality standards over 50 miles of stream beginning 150 miles below reservoir.
	2.....	Increase in salt concentration over 25 miles of stream from point x to point y due to salt load in return flow.	Increase in salt concentration over 25 miles of stream from point y to point z due to salt load in return flow.

TABLE 5.—BENEFICIAL AND ADVERSE EFFECTS FOR A PLAN
(USE ADDITIONAL TABLES FOR EACH ALTERNATIVE PLAN)

Social Factors

Components	Measures of effects
Beneficial and adverse effects:	
A. Real income distribution	Examples include: 1. Create 1,000 low to medium income permanent jobs for unskilled and semiskilled workers. 2. Plan has distribution of benefits by income class over first 20 years of operation as follows:

Income class (Dollars)	Percentage of adjusted gross income in class	Percentage benefits in class
Less than 3,000	11	22
3,000–10,000	62	64
More than 10,000	27	14

3. Reimbursement, taxes, and lands, easements, and rights-of-way contributed by region 1 total $2.25 million. These contributions have a distribution by income class as follows:

Income class (Dollars)	Percentage of adjusted gross income in class	Percentage contributions in class
Less than 3,000	11	25
3,000–10,000	62	60
More than 10,000	27	15

B. Life, health and safety	Examples include: 1. Provision of 100-year flood protection to city. 2. Production of x tons of fresh vegetables during winter months. 3. Create 10 small pools with drawdown of reservoir with attendant increase in mosquito population.
C. Emergency preparedness	Examples include: 1. Provide 100 mw. hydroelectric power centrally located in region not dependent upon importation and movement of fuel. 2. Proposed plan for preservation of scenic river will require using optimum sustained yield of groundwater resources to serve anticipated population over next 20 years.

TABLE 6.—SUMMARY COMPARISON OF TWO ALTERNATIVE PLANS (USE ADDITIONAL TABLE FOR EACH RELEVANT COMPARISON)

Objective/Account	Plan B	Recommended plan	Difference (recommended plan minus plan B)
National Economic Development:			
Beneficial effects	$5,000,000	$7,000,000	+$2,000,000
Adverse effects	5,000,000	6,000,000	+1,000,000
Net beneficial effects	0	1,000,000	+1,000,000
Environmental Quality Components:			
(Use same component stubs for beneficial and adverse effects as illustrated in table 3 Examples follow.)			

TABLE 6.—SUMMARY COMPARISON OF TWO ALTERNATIVE PLANS (USE ADDITIONAL TABLE FOR EACH RELEVANT COMPARISON)—Continued

Objective/Account	Plan B	Recommended plan	Difference (recommended plan minus plan B)
Beneficial and Adverse Effects:			
A. Open and green space, lakes.	A. Create lake with 3,000 surface acres, 60 miles of shoreline and depth of 70 feet with high quality water and excellent access.	A. Create lake with 3,500 surface acres, 70 miles of shoreline and depth of 80 feet with high quality water and excellent access. Inundate 3,500 acres of open and green space, 10 miles long and ½-mile wide, located along stream and near city.	A. Create larger lake by 500 surface acres, 10 miles of shoreline, and 10 feet of depth. Either plan would have high quality water and excellent access. Inundate 3,500 acres open and green space, 10 miles long and ½-mile wide, located along stream and near city.
B. Archeological resources.	B. Inundate recognized historical archeological feature.		B. Do not inundate recognized historical archeological feature.
Regional Development:			
Region 1—Components			
A. Income:			
Beneficial effects	$5,000,000	$7,300,000	+$2,300,000
Adverse effects	3,000,000	3,750,000	+750,000
Net beneficial effects	2,000,000	3,550,000	+1,550,000
B. Employment:			
Beneficial effects:			
Project construction employment.	1. 300 semiskilled jobs for 3 years.	1. 200 semiskilled jobs for 4 years	1. −100 semiskilled jobs per year for 3 years, but +200 semiskilled jobs for 1 year.
Project O&M employment.	2. 40 permanent semiskilled jobs.	2. 50 permanent semiskilled jobs	2. +10 permanent semiskilled jobs.
Employment in service and trade activities induced by and stemming from project operation.	3. 850 permanent semiskilled jobs.	3. 900 permanent semiskilled jobs	3. +50 permanent semiskilled jobs.
Adverse effects:			
Employment in activities induced by and stemming from displaced agricultural operations.	1. 15 permanent semiskilled jobs.	1. 50 permanent semiskilled jobs	1. +35 permanent semiskilled jobs.
Net beneficial effects.	1. 300 semiskilled jobs for 3 years.	1. 200 semiskilled jobs for 4 years	1. −100 semiskilled jobs per year for 3 years, but +200 semiskilled jobs for 1 year.
	2. 875 permanent semiskilled jobs.	2. 900 permanent semiskilled jobs	2. +25 permanent semiskilled jobs.
C. Population distribution; D. Regional economic base and stability; E. Education, cultural and recreational opportunities; F. Environmental conditions of special regional concern;	Beneficial and adverse effects by component evaluated in table 4 would be compared for the alternative plans and differences between plans noted.		

TABLE 6.—SUMMARY COMPARISON OF TWO ALTERNATIVE PLANS (USE ADDITIONAL TABLE FOR EACH RELEVANT COMPARISON)—Continued

Objective/Account	Plan B	Recommended plan	Difference (recommended plan minus plan B)
Region 2—Components			
A. Income:			
Beneficial effects	$2,500,000	$3,100,000	+$600,000
Adverse effects	2,600,000	3,250,000	+650,000
Net beneficial effects	−100,000	−150,000	−50,000
B. Employment:			
Beneficial effects:			
Project construction employment.	1. 100 semiskilled jobs for 3 years.	1. 100 semiskilled jobs for 4 years	1. Same number of semiskilled jobs per year for 3 years, but + 100 semiskilled jobs for 1 year.
Project O&M employment.	2.	2. 5 permanent semiskilled jobs	2. +5 permanent semiskilled jobs.
Employment in service and trade activities induced by and stemming project operation.	3. 80 permanent semiskilled jobs.	3. 95 permanent semiskilled jobs	3. +15 permanent semiskilled jobs.
Adverse effects:			
Employment in activities induced by and stemming from displaced agricultural operations.	1. 5 permanent semiskilled jobs.		1. −5 permanent semiskilled jobs.
Net beneficial effects.	1. 100 semiskilled jobs for 3 years.	1. 100 semiskilled jobs for 4 years	1. Same number of semiskilled jobs per year, for 3 years, but + 100 semiskilled jobs per year for 1 year.
	2. 75 permanent semiskilled jobs.	2. 100 permanent semiskilled jobs	2. 25 permanent semiskilled jobs.
C. Population distribution: D. Regional economic base and stability: E. Educational cultural and recreational opportunities: F. Environmental conditions of special regional concern:	Beneficial and adverse effects by component evaluated in table 4 would be compared for the alternative plans and differences between plans noted.		
Rest of Nation—Components			
A. Income:			
Beneficial effects	−$500,000	−$1,400,000	−$900,000
Adverse effects	700,000		−700,000
Net beneficial effects	−1,200,000	−1,400,000	−200,000
B. Employment:			
Beneficial effects:			
Project construction employment.	1. −300 semiskilled jobs for 3 years.	1. −200 semiskilled jobs for 4 years	1. +100 semiskilled jobs for 3 years but −200 semiskilled jobs for 1 year.
Project O&M employment.	2.	2. −5 permanent semiskilled jobs	2. −5 permanent semiskilled jobs.
Employment in service and trade activities induced by and stemming from project operation.	3. −25 permanent semiskilled jobs.	3. −45 permanent semiskilled jobs	3. −20 permanent semiskilled jobs.
Adverse effects:			
Employment in activities induced by and stemming from displaced agricultural operations.	1. −15 permanent semiskilled jobs.	1. −50 permanent semiskilled jobs	1. −35 permanent semiskilled jobs.
Net beneficial effects.	1. −300 semiskilled jobs for 3 years.	1. −200 semiskilled jobs for 4 years	1. +100 semiskilled for 3 years, but −200 semiskilled jobs for 1 year.
	2. −10 permanent semiskilled jobs.	2. 0 permanent semiskilled jobs	2. +10 permanent semiskilled jobs.
C. Population distribution: D. Regional economic base and stability: E. Educational, cultural and recreational opportunities: F. Environmental conditions of special regional concern:	Beneficial and adverse effects by component evaluated in table 4 would be compared for the alternative plans and differences between plans noted.		
Social Factors—Components (Use same component stubs for beneficial and adverse effects as illustrated in table 5. Examples follow.)			
Beneficial and Adverse Effects:			
A. Real income distribution.	A. Plan is neutral in distribution of benefits by income class over first 20 years' operation with percentage distribution of benefits by income class the same as percentage distribution of adjusted gross income in class.	A. Plan has distribution of benefits by income class over first 20 years of operation as follows: Income class (dollars) / Percentage of adjusted gross income in class / Percentage benefits in class Less than 3,000: 11 / 22 3,000–10,000: 62 / 64 More than 10,000: 27 / 14	A. Increase distribution of real income to low income persons.
B. Life, health and safety.	B. Provide 100-year flood protection to city.	B. Provide 50-year flood protection to city.	B. Do not provide 100-year flood protection to city; provide 50-year flood protection to city.
C. Emergency preparedness.	C. Plan would require using optimum sustained yield of groundwater resources to serve anticipated population over next 30 years with potential for overloading capacities of water resources systems.	C. Provide X kilowatts hydroelectric power generating capacity centrally located in region requiring importation of coal for conventional thermal plants.	C. Do not require use of optimum sustained yield of ground water resources; provide X kilowatts hydroelectric power generating capacity.

VII. Cost Allocation, Reimbursement, and Cost Sharing

On the basis of the identification provided for in the system of accounts for beneficial and adverse effects, an allocation of appropriate costs shall be made when an allocation of costs is required for purposes of establishing reimbursement levels, pricing policies, or cost sharing between the Federal Government and non-Federal public and private interests. All objectives and components of objectives shall be generally treated comparably in cost allocation and are entitled to their fair share of the advantages resulting from a multiobjective plan.

Reimbursement and cost-sharing policies shall be directed generally to the end that identifiable beneficiaries bear an equitable share of costs commensurate with beneficial effects received in full cognizance of the multiobjectives. Since existing cost-sharing policies are not entirely consistent with the multiobjective approach to planning water and land resources, these policies will be reviewed and needed changes will be recommended.

A. COST ALLOCATION

1. *Introduction.* The existence of joint contributions toward objectives and their components requires that an allocation of appropriate costs of a multiobjective plan be made for purposes of establishing reimbursement levels, pricing policies, or cost sharing between the Federal Government and non-Federal interests. Thus, when legislative or administrative policies regarding reimbursement, pricing levels, or cost sharing apply to a proposed multiobjective plan an allocation of appropriate costs shall be made. If such policies do not apply, no allocation of costs is necessary unless required for other administrative reasons.

For purposes of cost allocation, only the costs included in the national economic development account will be allocated among objectives and their components. Appropriate costs comprising the allocation of national economic development costs to the multiobjectives and their components will be identified for purposes of applying specific reimbursement and cost-sharing policies.

Objectives and their components will generally be treated comparably in the cost allocation with respect to the identification of alternatives, the evaluation of alternatives, and the determination of incremental and/or separable costs. However, the national economic development objective serves as the baseline for cost allocation since only national economic development costs are allocated.

2. *Summary of the cost allocation method.* The cost allocation method described herein is a modification and extension of the separable costs-remaining benefits method of cost allocation which has been used to allocate costs of a multi-purpose project to purposes served by the project.

In the multiobjective setting, cost allocation becomes a two-stage process involving the allocation of costs among objectives and then the further allocation of costs among components of objectives. The system of accounts showing beneficial and adverse effects for alternative plans will usually provide much of the information needed in this process. This is particularly true for incremental and separable costs which may be determined by comparing the appropriate alternatives including the alternative of no plan.

Under the first stage, the method provides for the allocation of national economic development costs among the several objectives. For cases when features of a plan are included to serve the environmental quality or the regional development objective and at the same time contribute incidentally to the national economic development objective, the methed provides that the incremental costs of such features be allocated among the objective served and the national economic development objective. Cases 1 and 2 attached are examples relating to this circumstance.

For cases when features of a plan are designated to serve the environmental quality or the regional development objective at the loss of net beneficial effects on the components of the national economic development objective served by the plan, and for cases when the entire plan is designated to serve the environmental quality or the regional development objective at the loss of net beneficial effects on national economic development, the method provides that costs equivalent to the net national economic development beneficial effects foregone be allocated to the objective served. Cases 3 and 4 attached are examples relating to these circumstances.

Under the second stage the method provides for the further allocation of national economic development costs allocated to objectives in stage 1 among the components of the objectives. In the case of the environmental quality and regional development objectives, this would be done by allocating to each component of those objectives a share of the national economic development cost based on the costs, comparably evaluated, of the alternative means most likely to be undertaken in the absence of the plan of obtaining the beneficial effects attributable to each component. In the case of the national economic development objective, costs would be allocated among the components of the objective using the separable costs-remaining benefits method of cost allocation essentially as applied in the past.

3. *The cost allocation method—a. Cost allocation among objectives.* When features of a plan are included to serve the environmental quality or the regional development objective or their components which are not economically justified, each objective shall be allocated—

Not less than the incremental national economic development costs net of any incidental incremental national economic development beneficial effects of achieving the beneficial effects attributable to each objective determined by identifying on a last added basis, the national economic development costs and beneficial effects of increments of scale of a plan intended primarily to serve each objective.

Nor more than the lesser of (1) gross incremental national economic development costs of achieving the beneficial effects attributable to each objective determined as discussed above, or (2) the costs, comparably evaluated, of the alternative means most likely to be undertaken in the absence of the plan of obtaining the beneficial effects attributable to each objective, or (3) the value of the beneficial effects attributable to each objective in the judgment of the recommending official.

Remaining joint national economic development costs (the total national economic development costs of the plan less the sum of the net incremental national economic development costs determined for each of the above objectives) shall be allocated among all objectives in proportion to: (1) The lesser of beneficial effects or the costs, comparably evaluated, of the alternative means most likely to be undertaken in the absence of the plan of obtaining the beneficial effects attributable to the national economic development objective in the case of that objective; and (2) the ceiling established under the procedures set forth above for the environmental quality and regional development objectives less any net incremental costs previously allocated to the environmental quality and regional development objectives.

When features of a plan are designated to serve the environmental quality or the regional development objective or their components at the loss of net beneficial effects on the components of the national economic development objective served by the plan, or when the entire plan is designated to serve the environmental quality or the regional development objective or their components at the loss of net beneficial effects on national economic development, costs equivalent to the net national economic development beneficial effects foregone shall be allocated to the objective served.

Following is an example table illustrating how the national economic development costs allocated to the multiobjectives may be displayed for the major alternative plans.

TABLE 1.—A DISPLAY OF NATIONAL ECONOMIC DEVELOPMENT COSTS ALLOCATED TO THE MULTIOBJECTIVES FOR THE MAJOR ALTERNATIVE PLANS

	NED	EQ	RD	Total allocated
Plan A:				
Plan element:				
1				
2				
3				
N				
Plan B:				
Plan element:				
1				
2				
3				
N				
Plan C:				
Plan element:				
1				
2				
3				
N				

b. Cost allocation among components—(1) Of the national economic development objective. National economic development costs allocated to the national economic development objective under the procedures discussed above for stage 1 shall be further allocated among components of that objective in the following manner:

Each component of the national economic development objective served by a plan shall be allocated—

Not less than the separable national economic development costs of achieving the beneficial effects attributable to each component determined under the assumption that each component is in turn omitted last from the plan, adjusted downward by an amount equivalent to the national economic development costs allocated to the environmental quality or regional development objective in the first stage of the cost allocation method in cases when a desired contribution to such objective stems directly from the provision of service to a national economic development component,

Nor more than the lesser of the beneficial effects or the costs, comparably evaluated, of the alternative means most likely to be undertaken in the absence of the plan of obtaining the beneficial effects atributable to each component.

Remaining joint national economic development costs (the total national economic development costs allocated to the national economic development objective in stage 1 less the sum of the separable national economic development costs determined for each component of that objective) shall be allocated among all components in proportion to the lesser of beneficial effects or alternative costs less any separable costs previously allocated to each component of the national economic development objective.

(2) *Of other objectives.* When required for establishing reimbursement levels, pricing policies, or cost sharing, the costs allocated to the environmental quality or the regional development objective in stage 1 will be further allocated among components of each objective in proportion to the costs, comparably evaluated, of the alternative means most likely to be undertaken in the absence of the plan of obtaining the beneficial effects attributable to each component.

Following is an example table illustrating how the national economic development costs allocated to the components of the multiobjectives may be displayed for the major alternative plans.

TABLE 2.—A DISPLAY OF NATIONAL ECONOMIC DEVELOPMENT COSTS ALLOCATED TO THE MULTIOBJECTIVES AND THEIR COMPONENTS FOR THE MAJOR ALTERNATIVE PLANS

	Allocated to		
	NED	EQ	RD
Plan A:			
Plan element 1	Water supply. Power. Flood control. Recreation. External economies. Et cetera.	Water quality. Open and green space. Wild rivers. Wetlands. Archeological features. Et cetera.	Regional output. Employment. Economic stability. Cultural opportunities. Historical sites. Et cetera.
	Total	Total	Total
Plan element: 2 3 N			
Plan B: Plan element: 1 2 3 N			
Plan C: Plan element: 1 2 3 N			

4. Definitions—a. Components. Components of the environmental quality and regional development objectives comprise the specific beneficial contributions toward these objectives desired in a particular planning setting. For purposes of cost allocation, components of the national economic development objective include the more traditional purposes such as power, water supply, flood control, recreation, irrigation, etc., and one new component which encompasses the category of beneficial effects for external economics.

b. Alternatives. The costs of selected alternative means of obtaining the contributions to an objective or component of an objective provide a limit on the costs to be allocated to an objective or component of an objective. The costs of selected alternative means of obtaining the contributions to one or more objectives or components are also determined to identify the incremental costs for the environmental quality or the regional development objective or their components and the separable costs for the components of the national economic development objective.

A range of possible alternatives to meet needs and problems, including types of measures and alternatives capable of application by various levels of government and by nongovernmental interests, should be considered. The alternative means of obtaining the relevant contributions to the multiobjectives to be selected for the above determinations should be those which would be physically displaced or economically precluded by the proposed plan and those which would likely be undertaken in the absence of the proposed plan.

The alternative means selected for the above determinations which would likely be physically displaced or economically precluded with implementation of the proposed plan, or increments thereto, will be evaluated on a comparable basis with the proposed plan with respect to their beneficial and adverse effects on the several objectives, including the treatment of national economic development costs and the discount rate used in the evaluation.

Taxes foregone on Federal alternatives and taxes paid on non-Federal alternatives will be excluded from such evaluations for the national economic development objective.

c. Incremental costs. For purposes of cost allocation, incremental costs are defined as the national economic development costs of including features in a plan intended primarily to serve an objective other than the national economic development objective. Such incremental costs will be determined under the assumption that each such objective is served in turn last. Gross incremental costs for the environmental quality or the regional development objective are the total incremental costs of features included in a plan primarily for that objective. Net incremental costs represent the gross incremental cost for one of these objectives less any incidental incremental national economic development beneficial effects that accrue as a result of including features in a plan for the same objective.

d. Separable costs. Separable costs are defined as the differences between the national economic development costs of a plan and the national economic development costs of the plan with each component of the national economic development objective in turn omitted, adjusted downward by an amount equivalent to the national economic development costs allocated to the environmental quality or regional development objective in the first stage of the cost allocation method in cases when a desired contribution to such objective stems directly from the provisions of service to a national economic development component.

e. Remaining joint costs. Remaining joint costs are defined below as they apply to stage 1 and stage 2 of the cost allocation method described herein.

For allocation of costs among objectives, remaining joint costs are defined as the difference between the total national ecomonic development costs of a multiobjective plan and the sum of the net incremental costs determined for the environmental quality and regional development objectives.

For allocation of costs among components of the national economic development objective, remaining joint costs are defined as the difference between the total national economic development costs allocated to the national economic development objective in the first

stage of the cost allocation method and the sum of the separable costs determined for the components of the national economic development objective.

5. *Application of the cost allocation method.* The cost allocation method described herein shall be applied to all multiobjective reservoir projects or plans. In the case of other types of projects or plans where currently some variation of the separable costs-remaining benefits method of cost allocation is used, or another procedure to allocate project economic costs among project purposes is used, national economic development costs allocated to the national economic development objective under stage 1 of the method described herein, may continue to be allocated among components of the national economic development objective following those procedures.

6. *Review of cost allocations.* Cost allocations will be reviewed to the extent appropriate when new contributions are made to objectives or their contributions cease, or when there is a material change in the level of contributions made toward the objectives and their components served by a project or plan. A revised cost allocation or a modification of the existing allocation will be made if, as the result of such review, it appears that a significant inequity may result if the existing allocation is not revised or modified. Due consideration will be given, in the event of a revision or modification of an existing allocation, to the relative periods of time over which contributions are made to the various objectives and their components.

The standards followed for the existing allocation will generally be followed in the revised allocation.

In the case of minor modifications, such as the withdrawal of water for municipal water supply from existing storage space, costs may be assigned to the new component in proportion to some comparable measure of use such as storage capacity, or on the basis of the value of the contributions made. If contributions to the new component result in a reduction in the contributions made to an existing reimbursable component, the cost assigned to the new component should be no less than the loss in revenues for the existing component.

7. *Case examples.* Attached to this section are five case examples illustrating the use of the cost allocation method described herein.

B. REIMBURSEMENT AND COST SHARING

1. *General.* Current reimbursement and cost-sharing policies will be reviewed in their entirety at an early date in light of experience gained from actual application of the new planning principles and standards. At that time, the basis for reimbursement and cost sharing now required, the need for adjustment of these policies, the need for new reimbursement and cost-sharing policies for other objectives and their components or entirely new approaches and appropriate repayment arrangements and interest rates for repayment will be extensively reviewed. Until this comprehensive review is completed, all current reimbursement and cost-sharing policies are considered to be in full force and effect.

Until such a review is completed interim reimbursement and cost-sharing arrangements may be recommended for consideration in individual authorization reports when the plan involves an objective or component for which no reimbursement or cost-sharing policy has yet been established.

2. *Cost sharing for enhancement of water quality.* A cost-sharing policy for enhancement of water quality is hereby adopted for Federal and federally assisted projects or plans. Until general legislation as necessary is approved to implement this policy, authorization reports when appropriate will make recommendations consistent with this policy.

When storage or facilities to augment, divert, retain, or otherwise regulate streamflow in addition to those provided for water supply, recreation, and other uses, are included in a plan for the purpose of meeting water quality standards, the value of the provision of such storage or facilities for this purpose shall be taken into account in determining the total beneficial effects of the entire plan of which they may be a part.

The total investment costs of the plan allocated to the environmental quality objective for such streamflow regulation to meet water quality standards shall be borne equally by the Federal Government and non-Federal entities. The total operation, maintenance, and replacement costs of the plan allocated to the environmental quality objective for this purpose shall be a non-Federal responsibility.

The non-Federal share of the investment costs of the plan allocated to the environmental quality objective for this component shall be borne by non-Federal interests, under any one or a combination of the following methods as may be determined appropriate by the head of the Federal agency having jurisdiction over the plan: (1) Cash payment upon completion of construction of major features of a project or plan providing streamflow augmentation, in an amount equivalent to the present worth of such costs discounted as appropriate using the interest rate in effect under the provisions of these Standards for the fiscal year in which the cash payment is made; (2) repayment in kind by provision of goods or services needed for the plan valued at fair market value under the same terms and conditions as discussed above for a cash payment; or (3) repayment within a 50-year repayment period of an amount equivalent to the present worth of such costs discounted as above, with interest based upon the interest rate in effect under the provisions of these standards for the fiscal year in which the repayment contract is signed.

The non-Federal share of the plan operation, maintenance, and replacement costs allocated to the environmental quality objective for this component shall be borne by non-Federal interests, under either or both of the following methods as may be determined appropriate by the head of the Federal agency having jurisdiction over the plan: (1) cash payment annually to the Federal Government, or (2) operate and administer storage or facilities provided for the purpose of meeting water quality standards and bear all the costs of operation, maintenance, and replacement incurred therefor but not to exceed the total of such costs allocated to the environmental quality objective for this component.

ILLUSTRATION OF COST ALLOCATION METHOD

Case 1—Incremental scale included in plan intended primarily to serve only one objective other than the national economic development objective.

A. *Project Data:*

	NED Plan A	Recommended Plan B
NED objective:		
Beneficial effects:		
FC	$50	$50
Recreation	20	30
Power	30	40
Total	100	120
Adverse effects:		
Project construction and OM&R	50	90
Net beneficial effects	50	30
EQ objective:		
Beneficial and adverse effects	1. 2. 3,000 acres flat water. 3. Inundate 10 miles free flowing stream.	1. Meet State water quality standards over 100-mile stream. 2. 3,500 acres flat water. 3. Inundate 11 miles free flowing stream.
RD objective:		
Income:		
Beneficial effects:		
FC	$50	$50
Recreation	15	15
Power	30	40
Additional net income accruing to region.	10	30
Total	105	135
Adverse effects:		
Reimbursement	25	35
Net beneficial effects	80	100
Employment:		
Beneficial and adverse effects	1. Create 300 jobs.	1. Create 300 jobs.
Regional economic base and stability:		
Beneficial and adverse effects	1. Create 300 low paid seasonal jobs.	1. Create 300 low paid seasonal jobs.

	NED Plan A	Recommended Plan B
Recreational opportunities: Beneficial and adverse effects	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.
EQ of special regional concern: Beneficial and adverse effects	1. 2. 3,000 acres flat water. 3. Inundate 10 miles free flowing stream.	1. Meet State water quality standards over 50 miles stream. 2. 3,500 acres flat water. 3. Inundate 11 miles free flowing stream.
Social factors: Beneficial and adverse effects	1. 50-year flood protection to city. 2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.	1. 50-year flood protection to city. 2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.
EQ objective: Beneficial and adverse effects		1. Meet State water quality standards over 100 miles stream. 2. 3,500 acres flat water. 3. Create 10,000 acres green space. 4. Inundate 11 miles free flowing stream. 5. Inundate 1 mile free flowing stream periodically. 6. Destroy 10,000 acres of desert.
RD objective: Income: Beneficial effects: FC		$50
Irrigation		10
Recreation		15
Power		40
Additional net income accruing to region		45
Total		160
Adverse effects: Reimbursement		40
Net beneficial effects		120
Employment: Beneficial and adverse effects		1. Create 65 farm operation jobs. 2. Create 400 other jobs.
Regional economic base and stability: Beneficial and adverse effects		1. Create 65 new family sized farms. 2. Create 100 full-time medium income jobs. 3. Create 300 low paid seasonal jobs.
Recreational opportunities: Beneficial and adverse effects		1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.
EQ of special regional concern: Beneficial and adverse effects		1. Meet the State water quality standards over 50 miles stream. 2. 3,500 acres of flat water. 3. Create 10,000 acres green space. 4. Inundate 11 miles free flowing stream. 5. Inundate 1 mile free flowing stream periodically. 6. Destroy 10,000 acres of desert.

B. *Allocation of NED Costs Among Objectives.*

1. Incremental NED costs and incidental incremental NED benefits associated with incremental scale included in Plan B intended to serve the environmental quality objective (reservoir capacity for downstream low flow augmentation):

	NED Plan A	Recommended Plan B	Difference
NED objective: Benefits	$100	$120	$20
Costs	50	90	40

Thus:

Gross incremental NED costs = $40

Net incremental NED costs = $20

2. Remaining joint NED costs of Plan B:

Total NED costs of Plan B	$90
Less net incremental NED costs of Plan B	−20
Remaining joint NED costs of Plan B	70

3. NED cost allocation table for Plan B for objectives:

	Objective			Total
	NED	EQ	RD	
1. Benefits	$120	(1)	$135	(2)
2. Alternative NED costs	$90	[3] $50	$90	(2)
3. Benefits limited	$90	[4] $40	(5)	$130
4. Net incremental NED costs	(2)	$20	(2)	$20
5. Remaining benefits	$90	$20	(2)	$110
Percent distribution	82	18	(2)	100
6. Remaining joint NED costs	$57	$13	(2)	$70
7. Total allocated NED costs	$57	$33	(2)	$90

[1] WQ standards 100 miles.
[2] Not applicable.
[3] NED costs of treatment at the source adequate to meet water quality standards over 100 miles of stream.
[4] Benefits limited by amount of gross incremental NED costs. In this case it is assumed the environmental quality benefits associated with meeting water quality standards over 100 miles of stream is worth at least $40 NED costs.
[5] Benefits to the RD objective incidental to Plan B, thus no NED costs to be allocated to this objective.

C. Allocation of NED Costs Among Components of the NED Objective.

1. Separable NED costs for NED components:

	Plan B	Plan B with FC omitted	Plan B with recreation omitted	Plan B with power omitted
Total NED costs	$90	$80	$85	$65

	Separable NED costs
Flood control	$10
Recreation	5
Power	25
Total	40

2. Remaining joint NED costs of NED objective:

Total NED costs allocated to NED objective	$57
Less total separable NED costs for NED components	−40
Remaining joint NED costs of NED objective	17

3. NED cost allocation table for Plan B for NED components:

	NED components			Total
	FC	Recreation	Power	
1. Benefits	$50	$30	$40	$120
2. Alternative NED costs	$20	$50	$30	$100
3. Benefits limited	$20	$30	$30	$80
4. Separable NED costs	$10	$5	$25	$40
5. Remaining benefits	$10	$25	$5	$40
Percent distribution	25	63	12	100
6. Remaining joint NED costs	$4	$11	$2	$17
7. Total allocated NED costs	$14	$16	$27	$57

Case 2—Increments of scale included in plan intended primarily to serve more than one objective other than the national economic development objective.

A. *Project Data:*

NED objective:	*Recommended Plan C*
Beneficial effects:	
FC	$50
Irrigation	10
Recreation	30
Power	40
Total	130
Adverse effects:	
Project construction and OM&R	110
Net beneficial effects	20

Social factors:	
Beneficial and adverse effects.	1. 50-year flood protection to city. 2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.

B. Allocation of NED Costs Among Objectives.

1. Incremental NED costs and incidental incremental NED benefits associated with incremental scale included in Plan C intended to serve the environmental quality objective (reservoir capacity for downstream low flow augumentation):

	Recommended plan with service to EQ objective deleted	Recommended Plan C	Difference
NED objective:			
Benefits	$110	$130	$20
Costs	70	110	40

Thus:
Gross incremental NED costs = $40
Net incremental NED costs = $20

2. Incremental NED costs and incidental incremental NED benefits associated with incremental scale included in Plan C intended to serve the regional development objective (reservoir capacity and associated distribution facilities for irrigation):

	Recommended plan with service to RD objective deleted	Recommended Plan C	Difference
NED objective:			
Benefits	$120	$130	$10
Costs	90	110	20

Thus:
Gross incremental NED costs = $20
Net incremental NED costs = $10

3. Remaining joint NED costs of Plan C:

Total NED costs of Plan C	$110
Less net incremental NED costs for low flow augmentation	−20
Less net incremental NED costs for service to irrigation lands	−10
Remaining joint NED costs of Plan C	80

4. NED cost allocation table for Plan C for objectives:

	Objective			Total
	NED	EQ	RD	
1. Benefits	$130	(1)	(2)	(3)
2. Alternative NED costs	$110	[4] $50	[5] $25	(3)
3. Benefits limited	$110	[6] $40	[7] $20	$170
4. Net incremental NED costs	(3)	$20	$10	$30
5. Remaining benefits	$110	$20	$10	$140
Percent distribution	79	14	7	100
6. Remaining joint NED costs	$63	$11	$6	$80
7. Total allocated NED costs	$63	$31	$16	$110

[1] WQ standards 100 miles.
[2] Increased benefits from $135 to $160.
[3] Not applicable.
[4] NED costs of treatment at the source adequate to meet water quality standards over 100 miles of stream.
[5] NED costs of direct transfer equivalent to increase in regional income.
[6] Benefits limited by amount of gross incremental NED costs. In this case it is assumed the environmental quality benefits associated with meeting water quality standards over 100 miles of stream is worth at least $40 NED cost.
[7] Benefits limited by amount of gross incremental NED costs. In this case it is assumed the regional development benefit associated with providing service to irrigation lands is worth at least $20 NED cost.

C. Allocation of NED Costs Among Components of NED Objective.

1. Separable NED costs for NED components:

	Plan C	Plan C with FC omitted	Plan C with irrigation omitted	Plan C with recreation omitted	Plan C with power omitted
Total NED costs	$110	$100	$90	$105	$85

	Separable NED costs
Flood control	$10
Irrigation (20–16) [1]	4
Recreation	5
Power	25
Total	44

[1] Note: In cases when the desired contribution to the EQ or RD objective stems directly from the provision of service to a NED component, the separable costs for the NED component must be adjusted downward by an amount equivalent to the NED costs allocated to the EQ or RD objective in the first stage of the cost allocation method.

2. Remaining joint NED costs of NED objective:

Total NED costs allocated to NED objective	$63
Less total separable NED costs for NED components	−44
Remaining joint NED costs of NED objective	19

3. NED cost allocation table for Plan C for NED components:

	NED components				Total
	FC	Irrigation	Recreation	Power	
1. Benefits	$50	$10	$30	$40	$130
2. Alternative NED costs	$20	$25	$50	$30	$125
3. Benefits limited	$20	$10	$30	$30	$90
4. Separable NED costs	$10	$4	$5	$25	$44
5. Remaining benefits	$10	$6	$25	$5	$46
Percent distribution	22	13	54	11	100
6. Remaining joint NED costs	$4	$3	$10	$2	$19
7. Total allocated NED costs	$14	$7	$15	$27	$63

Case 3—Increment of scale in plan operated to serve an objective other than the national economic development objective.

A. Project Data:

	Recommended plan with service to non-NED objective deleted	Recommended Plan D
NED objective:		
Beneficial effects:		
FC	$50	$50
Recreation	30	20
Power	40	30
Total	120	100
Adverse effects:		
Project construction and OM&R	90	80
Net beneficial effects	30	20
EQ objective:		
Beneficial and adverse effects	1.	1. Meets State water quality standards over 100 miles stream.
	2. 3,500 acres flat water.	2. 3,000 acres flat water.
	3. Inundate 11 miles free flowing stream.	3. Inundate 10 miles free flowing stream.
RD objective:		
Income:		
Beneficial effects:		
FC	$50	$50
Recreation	15	15
Power	40	30
Additional net income accruing to region	30	10
Total	137	105
Adverse effects:		
Reimbursements	35	25
Net beneficial effects	100	80
Employment:		
Beneficial and adverse effects	1. Create 300 jobs.	1. Create 300 jobs.
Regional economic base and stability:		
Beneficial and adverse effects	1. Create 300 low paid seasonal jobs.	1. Create 300 low paid seasonal jobs.
Recreational opportunities:		
Beneficial and adverse effects	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.
EQ of special regional concern:		
Beneficial and adverse effects	1.	1. Meets State water quality standards over 50 mile stream.
	2. 3,500 acres flat water.	2. 3,000 acres flat water.
	3. Inundate 11 miles free flowing stream.	3. Inundate 10 miles free flowing stream.
Social factors:		
Beneficial and adverse effects	1. 50-year flood protection to city.	1. 50-year flood protection to city.
	2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.	2. Provision of 45 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.

Objectives.

1. Incremental NED costs and incidental incremental NED benefits associated with feature included in recommended plan operated to serve the environmental quality objective (reservoir capacity for downstream low flow augmentation):

	Recommended plan with service to EQ objective deleted	Recommended Plan D	Difference
NED objective:			
Benefits	$120	$100	−$20
Costs	90	80	−10
Net benefits	30	20	−10

NOTE: In this case example it has been assumed that in the absence of providing service to the EQ objective the power and recreation components would be scaled within the plan to maximize net NED benefits. As shown above, additional incremental NED costs for specific power and recreation facilities to maximize these net benefits is assumed to be $10 under an alternative operating plan where no provision is made for low flow releases. Incremental NED benefits for power and recreation is assumed to be $20 under such an alternative operating arrangement.

A further implied assumption in this case example is that it is more efficient to forego power and recreation net benefits than it would be to add additional capacity in the reservoir to make low flow releases beyond that which maximizes power and recreation net NED benefits. This may frequently be the case, i.e. to increase reservoir capacity beyond that assumed for either alternative operating arrangement would be very costly due to, for example, major road, railroad, or bridge relocations.

In this situation where the recommended multiobjective plan does not represent the inclusion of increments of scale for the EQ or the RD objective to a plan which has been scaled to maximize net NED benefits, but rather because of efficiency considerations involves a tradeoff between net NED benefits and contributions to the EQ or the RD objective, the concept of gross incremental costs and net incremental costs has to be viewed in terms of net NED benefits foregone.

Thus:
Gross incremental NED costs = $10
Net incremental NED costs=$10

2. Remaining joint NED costs of Plan D:

Total NED costs of Plan D	$80
Less net incremental NED costs Plan D	−10
Remaining joint NED costs of Plan D	70

3. NED cost allocation table for Plan D for objectives:

	Objective			Total
	NED	EQ	RD	
1. Benefits	$100	(1)	$105	(3)
2. Alternative NED costs	$80	[3] $15	$80	(2)
3. Benefits limited	$80	[4] $10	(5)	$90
4. Net incremental NED costs	(2)	$10	(2)	$10
5. Remaining benefits	$80	0	(5)	$80
Percent distribution	100	0	(2)	100
6. Remaining joint NED costs	$70	0	(2)	$70
7. Total allocated NED costs	$70	$10	(2)	$80

[1] WQ standards 100 miles.
[2] Not applicable.
[3] NED costs of treatment at the source adequate to meet water quality standards over 100 miles of stream.
[4] Benefits limited by amount of gross incremental NED costs which are the same as net incremental NED costs. In this case it is assumed the environmental quality benefits associated with meeting water quality standards over 100 miles of stream is worth at least $10 NED costs.
[5] Benefits to RD objective incidental to Plan D, thus no NED costs to be allocated to this objective.

C. Allocation of NED Costs Among Components of NED Objective.

1. Separable NED costs for NED components:

	Plan D	Plan D with FC omitted	Plan D with recreation omitted	Plan D with power omitted
Total NED costs	$80	$70	$75	$60

	Separable NED costs
Flood control	$10
Recreation	5
Power	20
Total	35

2. Remaining joint NED costs of NED objective:

Total NED costs allocated to NED objective	$70
Less total separable NED costs for NED components	−35
Remaining joint NED costs of NED objective	35

3. NED cost allocation table for Plan D for NED components:

	NED components			Total
	FC	Recreation	Power	
1. Benefits	$50	$20	$30	$100
2. Alternative NED costs	$30	$40	$25	$95
3. Benefits limited	$50	$20	$25	$75
4. Separable NED costs	$10	$5	$20	$35
5. Remaining benefits	$20	$15	$5	$40
Percent distribution	50	38	12	100
6. Remaining joint NED costs	$18	$13	$4	$35
7. Total allocated NED costs	$28	$18	$24	$70

Case 4—The plan is unjustified in terms of the national economic development objective, and no alternative formulation can be developed that is justified in terms of this objective but the plan is recommended in view of net contributions to another objective.

A. *Project Data:*

	Recommended Plan E
NED objective:	
Beneficial effects:	
Irrigation	$50
Recreation	20
Power	30
Total	100
Adverse effects:	
Project construction and OM&R	130
Net beneficial effects	−30
EQ objective:	
Beneficial and adverse effects.	1. 3,000 acres flat water. 2. Create 50,000 acres green space. 3. Inundate 10 miles free flowing stream. 4. Destroy 50,000 acres of desert.
RD objective:	
Income:	
Beneficial effects:	
Irrigation	$ 50
Recreation	15
Power	30
Additional net income accruing to region	80
Total	175
Adverse effects:	
Reimbursement	60
Net beneficial effects	115
Employment:	
Beneficial and adverse effects.	1. Create 320 farm operation jobs. 2. Create 800 other jobs.
Regional economic base and stability:	
Beneficial and adverse effects.	1. Create 320 new family sized farms. 2. Create 500 full-time medium income jobs. 3. Create 300 low paid seasonal jobs.
Recreational opportunities:	
Beneficial and adverse effects.	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.
EQ of special regional concern:	
Beneficial and adverse effects.	1. 3,000 acres flat water. 2. Create 50,000 acres green space. 3. Inundate 10 miles free flowing stream. 4. Destroy 50,000 acres of desert.
Social factors:	
Beneficial and adverse effects.	1. Plan has distribution of net regional income beneficial effects by income class over first 20 years of operation as follows:

Income class (dollars)	Percentage of adjusted gross income in class	Percentage net benefits in class
Less than 3,000	11	22
3,000–10,000	62	64
More than 10,000	27	14

2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.

B. *Allocation of NED Costs Among Objectives.*

1. Incremental NED costs and incidental incremental NED benefits associated with

scale included in Plan E intended to serve the regional development objective:

	Marginal benefits and costs of alternative uses of resources required for Plan E	Recommended Plan E	Difference
NED objective:			
Benefits	$130	$100	−$30
Costs	130	130	0
Net benefits	0	−30	−30

Thus:
Gross incremental NED costs = $30
Net incremental NED costs = $30

2. Remaining joint NED costs of Plan E:

Total NED costs of Plan E	$130
Less net incremental NED costs of Plan E	−30
Remaining joint NED costs of Plan E	100

3. NED cost allocation table for Plan E for objectives:

	Objective			Total
	NED	EQ	RD	
1. Benefits	$100	(Qualitative)	$175	(1)
2. Alternative NED costs	$130	$130	$130	(1)
3. Benefits limited	$100	(2)	[3] $30	$130
4. Net incremental NED costs	(1)	(1)	$30	$30
5. Remaining benefits	$100	(1)	0	$100
Percent distribution	100	(1)	0	100
6. Remaining joint NED costs	$100	(1)	0	$100
7. Total allocated NED costs	$100	(1)	$30	$130

[1] Not applicable.
[2] Benefits to the EQ objective incidental to Plan E, thus no NED costs to be allocated to this objective.
[3] Benefits limited by amount of gross and net incremental NED costs. In this case it is assumed the regional development net benefits associated with Plan E are worth at least $30 NED costs.

C. *Allocation of NED Costs Among Components of NED Objective.*

1. NED cost allocation table for Plan E for NED components:

	NED component			Total
	Irrigation	Recreation	Power	
1. Benefits	$50	$20	$30	$100
Percent distribution	50	20	30	100
2. Total allocated NED costs	$50	$20	$30	$100

Case 5—Incremental scale included in plan intended primarily to serve the environmental quality objective and incremental scale included in plan intended primarily to serve the regional development objective.

A. *Project Data:*

	Recommended Plan F
NED objective:	
Beneficial effects:	
Flood control	110
Irrigation	70
Recreation	10
Power	40
External economies	10
Total	200
Adverse effects:	
Adverse effects:	
Project construction and OM&R	145
External diseconomies	5
Total	150
Net beneficial effects	50
EQ objective:	
Beneficial and adverse effects.	1. Meets State water quality standards over 100 miles stream. 2. 5,000 acres flat water. 3. Create 50,000 acres green space. 4. Inundate 16 miles free flowing streams. 5. Inundate 6 miles free flowing streams periodically. 6. Destroy 50,000 acres of desert.
RD objective:	
Income:	
Beneficial effects:	
FC	$50
Irrigation	70
Recreation	15
Power	40
External economies.	10
Unemployed resources.	40
Additional net income accruing to region.	130
Total	355
Income:	
Adverse effects:	
Reimbursement.	$ 70
External diseconomies.	5
Loss of assistance payments.	15
Loss of net income in region.	20
Total	110
Net beneficial effects.	245
Employment:	
Beneficial effects.	1. Create 320 farm operation jobs. 2. Create 1,500 other jobs. 3. Create 400 jobs for 4 years.
Adverse effects.	1. Loss of 200 jobs.
Net beneficial effects.	1. Create 320 farm operation jobs. 2. Create 1,300 other jobs. 3. Create 400 jobs for 4 years.
Regional economic base and stability:	
Beneficial and adverse effects.	1. Create 320 new family size farms. 2. Create 1,200 full-time medium income jobs. 3. Create 400 medium income jobs for 4 years. 4. Create 300 low paid seasonal jobs.
Recreational opportunities:	
Beneficial and adverse effects.	1. Create diversity of recreational opportunity including: a. 7,500 man-days boating; b. 3,800 man-days fishing; c. 20,000 man-days picnicking.
EQ of special regional concern:	
Beneficial and adverse effects.	1. Meets State water quality standards over 50 miles stream. 2. 5,000 acres flat water. 3. Create 50,000 acres green space. 4. Inundate 16 miles free flowing stream. 5. Inundate 6 miles free flowing stream periodically. 6. Destroy 50,000 acres of desert.
Social factors:	
Beneficial and adverse effects.	1. 42-year flood protection to city. 2. Provision of 50 MW hydropower capacity centrally located in region not dependent upon importation and movement of fuel.

B. *Allocation of NED Costs Among Objectives.*

1. Incremental NED costs and incidental incremental NED benefits associated with incremental scale included in Plan F intended to serve the environmental quality objective (reservoir capacity for downstream low flow augmentation):

	Recommended plan with service to EQ objective deleted	Recommended Plan F	Difference
NED objective:			
Benefits:			
Recreation	$20	$30	.....
Power	30	40	.....
Other	130	130	.....
Total	180	200	$20
Costs	110	150	40

Thus:
Gross incremental NED costs = $40
Net incremental NED costs = $20

2. Incremental NED costs and incidental incremental NED benefits associated with incremental scale included in Plan F intended to serve the regional development objective (reservoir capacity, distribution system and pump lift to serve benchlands not incrementally economically justified):

	Recommended plan with service to RD objective deleted	Recommended Plan F	Difference
NED objective:			
Benefits:			
Irrigation	$50	$70	.....
Other	130	130	.....
Total	180	200	$20
Costs	110	150	40

Thus:
Gross incremental NED costs = $40
Net incremental NED costs = $20

3. Remaining joint NED costs of Plan F:

Total NED costs of Plan F	$150
Less net incremental NED costs for low flow augmentation	−20
Less net incremental NED costs for benchland irrigation	−20
Remaining joint NED costs of Plan F	110

4. NED cost allocation table for Plan F for objectives:

	Objective			Total
	NED	EQ	RD	
1. Benefits	$200	(1)	(2)	(3)
2. Alternative NED costs	$150	[4] $50	[5] $50	(3)
3. Benefits limited	$150	[6] $40	[7] $40	(3)
4. Net incremental NED costs	(3)	$20	$20	$40
5. Remaining benefits	$150	$20	$20	$190
Percent distribution	78	11	11	100
6. Remaining joint NED costs	$86	$12	$12	$110
7. Total allocated NED costs	$86	$32	$32	$150

[1] WQ standards 100 miles.
[2] Increased benefits from $305 to $355.
[3] Not applicable.
[4] NED costs of treatment at the source adequate to meet water quality standards over 100 miles of stream.
[5] NED costs of direct transfer equivalent to increase in regional income.
[6] Benefits limited by amount of gross incremental NED costs. In this case it is assumed the environmental quality benefits associated with meeting water quality standards over 100 miles of stream is worth at least $40 NED cost.
[7] Benefits limited by amount of gross incremental NED costs. In this case it is assumed the regional development benefit associated with providing service to benchlands is worth at least $40 NED cost.

C. Allocation of NED Costs Among Components of NED Objective.

1. Separable NED costs for NED components:

	Plan F	Plan F with FC omitted	Plan F with irrigation omitted	Plan F with recreation omitted
Total NED costs	$150	$140	$98	$145

	Plan F	Plan F with power omitted	Plan F with external economies omitted
Total NED costs	$150	$125	$150

	Separable NED costs
Flood control	$10
Irrigation (52–32)	20
Recreation	5
Power	25
External economies	0
Total	60

2. Remaining joint NED costs of NED objective:

Total NED costs allocated to NED objective	$86
Less total separable NED costs for NED components	−60
Remaining joint NED costs of NED objective	26

3. NED cost allocation table for Plan F for NED components:

	NED components					Total
	FC	Irrigation	Recreation	Power	External economies	
1. Benefits	$50	$70	$30	$40	$10	$200
2. Alternative NED costs	$50	$100	$50	$30	[1] $10	$240
3. Benefits limited	$50	$70	$30	$30	$10	$190
4. Separable NED costs	$10	$20	$5	$25	0	$60
5. Remaining benefits	$40	$50	$25	$5	$10	$130
Percent distribution	31	38	19	4	8	100
6. Remaining joint NED costs	$8	$10	$5	$1	$2	$26
7. Total allocated NED costs	$18	$30	$10	$26	$2	$86

[1] Alternative NED costs assumed to be equal to NED benefits for this component.

VIII. National Program for Federal and Federally Assisted Activities

A. Introduction

With an ideally developed system of multiobjective planning in which national priorities and budget constraints were integrated with local and regional priorities, the approaches in the principles and standards would result in a national program of the appropriate emphasis and size. In the ideally developed system, there would be no necessity for a second round where national priorities and budget constraints are imposed on plans developed according to other priorities.

Since we are far from the ideal multiobjective system of planning, an interim approach is described below.

Up to this point, these standards have been concerned with alternative plans for projects, States, regions, or river basins. The evaluation, systematic display, and comparison of alternative plans provide an indication of the priorities given the various objectives in selecting a recommended plan whether for projects, States, regions, or river basins. Such plans include both Federal and non-Federal activities and are of concern to all levels of government.

In formulating a national program of Federal and federally assisted activities for water and land resources, national priorities must be established among recommended project, State, region, or river basin plans. The system of accounts for beneficial and adverse effects for recommended plans, together with other criteria such as available budget resources, national policy toward the environmental quality, or regional development objectives, social effects, and public and private investment alternatives, will provide information needed for formulating a national program.

The Council will develop and put into operation a national programing system to support decisions as to long-range priorities for water and land resource activities. While the elements of such a system already exist in the member departments, what is needed is a common system to bring the information together and to insure that future field studies in multiobjective planning are consonant with the national system.

It is essential that the planning process not only articulate the full range of choice available for meeting any given level of needs, but that it also provide information which would be a basis for determining the order in which needs are to be fulfilled. Criteria for such selections should flow from the decisions made in regard to the priorities assigned to the multiobjectives.

Clearly, a choice exists as to which of the multiobjectives are to be emphasized. However, having assigned priorities to these respective objectives, these decisions must then be related to the instruments available for policy implementation—the most important being the annual budget within which national priorities are reflected for all Federal and federally assisted activities.

The appropriation of funds to implement a particular plan represents the termination of one planning cycle and the initiation of another. For this reason, priorities established in the planning process may be reinforced or altered by subsequent budgeting decisions. Different types of priority decisions are required in each level of planning. Priority decisions in formulating plans for projects are responsive to the kinds and quantities of project outputs expected. In formulating plans for regions or river basins, priorities are established among alternative courses of action. In formulating national programs, priorities may be assigned among the various river basin plans which are in competition for the same limited funds.

B. Priorities in Plan Formulation

Formulation of plans for projects can be viewed as the process of selecting specific measures for meeting identified problems and needs. Since combinations of individual measures generate different effects in a geographic area and since a multitude of such combinations is possible, formulation of plans for projects requires that priorities be established not only in regard to the objectives which are to be emphasized in each alternative formulation, but also in regard to which of the alternative formulations are to be recommended. Therefore, it should be clear that priorities are necessarily established, either explicitly or implicitly, during the process of formulating project plans.

A plan for a region or river basin is a sequence of actions or measures which upon implementation will result in meeting the problems and needs for water and land resource development. The project

level of planning accords priorities and subsequently selects (assigns a priority to) that formulation which makes the most beneficial contribution to those objectives considered to be most important. However, it is not until regional or river basin level of planning is undertaken that the resulting projects are accorded a priority in terms of their time phasing or sequence of implementation.

The problems and needs for water and land resource development vary among the different regions of the Nation, a major reason for this variance being the economic, social, and environmental conditions uniquely associated with different geographic areas. It is for this reason that water and land resource plans are formulated for and apply to well-defined geographic areas, either river basins or other designated regions.

Recognizing the existence of budget constraints, a choice must be made as to whether or not each plan is to progress toward completion at the same rate or whether plans for some regions are to progress at accelerated rates. Whatever the choice, it represents a priority decision in formulating a national program.

Since plans are directed toward meeting problems and needs in designated geographic areas, choosing priorities among regional or river basin plans reflects, in practical terms, the assignment of priorities to geographic areas. Therefore, in the budgetary sense, national program formulation is the allocation of a multiyear budget among geographic areas.

C. ESTABLISHING PRIORITIES

The President and the Congress, through the authorization, budgetary, and appropriation process, are ultimately responsible for assigning priorities for implementation of Federal activities. At an earlier stage, however, the Water Resources Council has certain responsibilities with regard to priorities. These standards amplify upon those responsibilities by requiring member agencies to formulate long-range national and regional programs for water and land resource activities.

1. *Project plans.* To assure that adequate data are available for subsequent steps in the process of national programing for water and land resource activities, it is essential in the process of formulating plans for a project that sufficient information with respect to the contributions that alternative plans make to the multiobjectives be clearly developed and reported.

2. *Basin plans.* With respect to basin or regional plans, it is necessary to establish priorities among the various activities in a plan and to present a clear statement of their most effective sequence of implementation. Many basin plans have contained early action programs which single out the projects for more immediate needs. However, the criteria for this choice generally are not related to national priorities for water and land resource activities.

Under existing procedures, priorities for Federal and federally assisted activities are usually established by agency recommendations to the President and by specification in the President's annual budget messages to the Congress. Public review of these priorities is generally limited to testimony before the various congressional subcommittees which are considering the budget requests for a particular agency.

Since the priorities set forth in the Federal budget are usually limited to actions to be undertaken within an ensuing fiscal year, State and local planning groups are forced to make highly uncertain projections in regard to the future activities of Federal water and land programs. These standards provide that river basin commissions and entities designated by the Water Resources Council to perform the functions of a river basin commission recommend long-range schedules of priorities for the collection and analysis of basic data and for the investigation, planning, and construction of projects. State members of river basin commissions have a responsibility to participate in establishing the long-range schedule of priorities. These standards require that each Federal agency that is a member of a river basin commission or entity performing the functions of a commission participate in the preparation of such a long-range schedule of priorities. Such a schedule is to reflect priorities to be accorded to previously authorized projects, as well as those recommended for authorization during each 5-year period in the schedule. The recommended schedule of priorities should accompany all requests for congressional authorization and funding. A copy of the schedule should also be forwarded to the Governors of the appropriate States for review and comment.

3. *National programs.* The single most perplexing problem in water and land resource programing is the integration of regional and river basin plans into a national program of Federal and federally assisted activities for the management and use of the Nation's water and land resources. In order that the Council may make a continuing study of the relation of regional or river basin plans to the requirements of larger regions of the Nation and to the Nation as a whole, these standards require that each member of the Council prepare a 5-year national program of water and land resource activities for submission through the Council to the President. The 5-year program is to include an identification of priority activities for collection and analysis of basic data and for the investigations, planning, and construction of projects which are to be initiated in each region during the period. The amount of program funds to be allocated to a particular region or basin is not to be based upon a rigid mathematical formula but, consistent with the level of funds prospectively available, upon an assessment of the relative needs for water resource activities in the respective regions. The national program and its regional allocations is to be continually reviewed and modified periodically to reflect the changing needs for water resource activities.

IX. COORDINATION AND REVIEW OF PLANNING STUDIES

A. INTRODUCTION

The success of multiobjective planning depends on meaningful participation of interests concerned with each objective at each step in the planning process. The leaders for water and land resource planning have the challenging responsibility of achieving such participation while managing effective planning studies and facilitating decisionmaking. This responsibility will require an aggressive program to involve all concerned interests in identifying an area's problems and needs, in planning alternative solutions, and in decisions as to action.

Federal planning and participation in planning will be carried out on a coordinated basis from the earliest consideration of planning needs and priorities through initiation of an investigation or survey and the entire process of planning and review. When warranted, joint Federal agency-State planning for regions or river basins will be arranged by the Council. Full advantage is to be taken of existing field organizations and arrangements for coordination, such as river basin commissions, other regional agencies or commissions, Federal-State interagency committees, interstate bodies, and State and local agencies. When any Federal agency initiates an investigation, it shall follow the Water Resources Council's standards for appropriate coordination and consideration of problems of mutual concern with other Federal agencies and with interested regional, State, and local public agencies and private interests.

B. NATIONAL PROGRAM OF PLANNING STUDIES

The Water Resources Council will prepare and keep up to date a national program of water and land resource planning studies. This program will include a long-range schedule of priorities for:

1. Framework studies and assessments;
2. Regional or river basins studies; and
3. Implementation studies.

1. *Framework studies and assessments.* In accordance with section 102 of the Water Resources Planning Act, the Council will maintain a continuous study of water requirements and the adequacy of water supplies to meet them. The Council will publish periodically an assessment of the Nation's water and land resources, and will publish as needed framework studies and assessments for the major regions of the country.

The reports on framework studies and assessments will be prepared by the regional entities designated by the Council. The Council shall review such reports as to the adequacy of water supplies to meet requirements in the region; the relation of the regional programs to the larger regions of the Nation; the adequacy of administrative and statutory means for coordination among Federal agencies; the adequacy of existing policy and programs to meet such requirements; and other regional and national problems in the conservation, development, and utilization of water and land resources as the Council may determine.

Framework studies and assessments will be included in the periodic national assessment reports and as appropriate may be transmitted separately by the Council to the Congress.

2. *Regional or river basin studies.* As part of its comprehensive planning responsibilities, each river basin commission is directed under the Water Resources Planning Act to recommend long-range schedules of priorities for the collection and analyses of basic data and for investigation, planning, and construction of projects. Where commissions have adopted such long-range schedules, the Council and Federal departments and agencies shall use the commissions' recommendations in establishing priorities for regional or river basin planning studies. Study leaders shall be provided by or designated by river basin commissions in their respective areas.

Where a river basin commission has not been established under title II of the Water Resources Planning Act, the Council may designate some other regional entity to perform the function of a river basin commission in recommending priorities for planning studies. Study leaders shall be provided by or designated by the Council in these areas.

For multiobjective regional or river basin planning studies, the Council will have prepared and will submit budgets with suitable statements of justifications for consideration in establishing the President's budget. These statements will outline a brief plan of study, including arrangements for study coordination and management.

When a budget for a regional or river basin study has been approved, the Council will prepare terms of reference for the study, provide or designate the study manager, and prepare the coordination arrangements, including designation of participating Federal agencies and States. The study manager shall submit a detailed plan of study, prepared in accordance with the Council's Handbook for Regional or River Basin Studies, for review and approval of the Council. The study manager will be responsible for the efficient management of the study and for organizing the study so that all concerned interests may participate in the planning process. When the objectives of the regional or river basin planning study have been identified, as provided in section V, Plan Formulation, the study manager will prepare a statement of the specified components of the multiobjective and the probable effects of the plan on such objectives. A copy of this statement will be sent to the Water Resources Council and to the Council on Environmental Quality as a preliminary report under section 102(2)(C) of the National Environmental Policy Act of 1969.

The study manager will submit completed reports of regional or river basin planning studies to the Water Resources Council for review. Copies shall be furnished to the Council on Environmental Quality.

The procedure for processing of reports from river basin commissions is presented below. For reports of studies in other areas, the Council will prepare its review report which may include modifications of the plan and after clearance with the Office of Management and Budget will transmit its report and the plan to the Congress for appropriate action.

a. River Basin Commission plan reports. These reports will be submitted to the Water Resources Council for review in accordance with the Water Resources Planning Act. Copies will be furnished to the Council on Environmental Quality. The Water Resources Council will prepare a report of its review which may include revision of plans for Federal projects included in the commission's plan.

The Council will review each plan prepared by a river basin commission with special regard to:

1. The efficacy of such plan in achieving optimum use of the water and land resources in the area involved;

2. The effect of the plan on the achievement of other programs for the development of agricultural, urban, energy, industrial, recreational, fish and wildlife, and other resources of the Nation; and

3. The contributions which such plan will make in achieving the Nation's economic and social goals.

The Council will formulate such recommendations as it deems desirable in the national interest and transmit them, together with the plan or revision of the river basin commission and the views, comments, and recommendations with respect to such plan or revision submitted by any Federal agency, Governor, interstate commission, or U.S. section of an international commission, to the President for his review and transmittal to the Congress with his recommendations in regard to authorization of Federal projects.

b. Coordinated State plans. Federal agencies administering programs of Federal assistance to States and other public bodies shall report to the Council on pending applications the information required to carry out the Council's responsibility for coordination of Federal assistance programs and other Federal programs under the Water Resources Planning Act.

In carrying out its coordination function, the Council will encourage State planning agencies to submit a program for planning water and land resources which shows how Federal assistance from various sources is to be used with resources from State and other public bodies to accomplish State objectives. The Council will coordinate such State program proposals with proposed Federal planning to avoid duplication and to facilitate effective use of planning resources.

When a State program for use of Federal assistance has been approved by the Council, Federal agencies will be guided by the State program in approving applications for grants and other Federal assistance.

Copies of reports resulting from federally assisted planning shall be distributed for information by the Federal agency responsible for the program to the Water Resources Council, to the appropriate river basin commission, and to designated offices in member agencies. The Council will include a distribution list in its Handbook for Coordination of Planning Studies and Reports. These reports will be used for information in preparing the national planning program.

c. Handbook for regional and river basin studies. The Council will issue and keep up to date a Handbook for Regional or River Basin Studies. This handbook will set forth procedures for preparing work plans, establishing study management, preparing budgets, and the application of principles and standards in regional or river basin studies.

3. *Implementation studies—a. Council coordination.* To facilitate the coordination of water and land resources planning studies among the agencies represented on the Water Resources Council, the Federal agencies, on or before July 1 of each year, will exchange, through the Council, lists of implementation studies which are under consideration as proposed new planning starts for the fall budget submissions. The lists will include information concerning the type of study, study name, purpose, location, estimated duration, and a preliminary estimate of total cost. Information will be included on the relation of the proposed implementation study to priorities established by the Council on the basis of recommendations by river basin commissions or other regional entities and to State planning programs. On the basis of this information and the information on applications for federally assisted programs, the Council will prepare its recommendations, for "administrative use only," as to a national program of implementation studies that should be considered for initiation in the succeeding fiscal year.

Each Federal agency will (on an "administrative use only" basis) keep the Council informed of action on implementation studies included in the Council's recommended national program during the budgetary and appropriation process. When the appropriations have been approved, each Federal agency will advise the Water Resources Council which implementation studies have been funded, the assignment of study management, and any special coordination arrangements.

b. Field coordination of implementation studies. River basin commissions established under the Water Resources Planning Act serve as the principal agency for the field level coordination of Federal, State, interstate, local, and nongovernmental planning efforts for the development of water and land resources in their areas of responsibility. Procedures to accomplish this will be developed by the commissions consistent with the Water Resources Planning Act and applicable rules, regulations, and guidelines of the Water Resources Council.

Where a river basin commission has not been established under title II of

the Water Resources Planning Act, other entities may be requested by the Water Resources Council to coordinate planning studies.

The following are the minimum procedures for field level coordination and shall apply in those regions where a river basin commission has not been established, and may be used or adapted for use by a commission in the area where one has been established:

(1) *Initiation of implementation studies.* When any implementation study has been funded, the field office responsible for its initiation will inform the corresponding field offices of the other Federal departments and agencies, river basin commissions, States, and concerned local agencies of this action. This written communication will request a statement, within a specified period of time, as to what interests they may have in the proposed study, what pertinent data they may have or know about that can be made available, and what preliminary comments and suggestions on these subjects they may care to make.

(2) *Coordination during studies.* When the objectives for an implementation study have been identified, as provided in section V, Plan Formulation, the planning organization will prepare a public statement of the specified components of the objectives and probable effects of the plan on such objectives. A copy of this statement will be sent to the Water Resources Council and to the Council on Environmental Quality for a preliminary report under section 102(2)(C) of the National Environmental Policy Act.

As the plan which is to be incorporated in the report is being formulated, the head of the field office responsible for the report will periodically communicate and arrange for mutually desired conferences with the corresponding field offices of Federal departments or agencies, river basin commissions, States, and concerned local agencies which have indicated an interest. The purpose of these communications and conferences are to determine what pertinent data are in existence, to arrange schedules for obtaining assistance and for obtaining additional data without duplication, to interchange information, to discuss the proposed plan and report, and to identify areas where there may be complementary or competitive effects.

(3) *Field review of reports.* When the report by the responsible field office has been completed, it will be submitted prior to official transmission to higher authority, to the other interested field offices of Federal departments and agencies, river basin commissions, States, and concerned local agencies for review and comment. Reports will be revised as may be necessary to reflect mutually acceptable changes. Suggestions on which agreement is not reached and which are not otherwise resolved will be recorded in the field office comments.

c. *Review of Federal implementation study reports.* The following types of final reports will be referred by the responsible agency head to the heads of other departments or agencies in Washington, D.C., and States for review and comment and to the Water Resources Council office for information; and the Council on Environmental Quality in accordance with section 102(2)(C) of the National Environmental Policy Act:

1. Reports required to be submitted to other departments or agencies and States in accordance with existing law;

2. Reports prior to project authorization in which other agencies have participated, have an interest, or on which the originating agency desires comments or views; and

3. Reports following project authorization when, in the opinion of the head of the responsible agency, the comments or views of other departments or agencies are necessary or desirable prior to initiation of construction activities.

The Water Resources Council will review and comment on reports of implementation studies in areas covered by regional or river basin plans. The Council will also review reports that contain innovations in planning procedures or cost-sharing arrangements, or which have unresolved evaluation or coordination problems. Federally assisted studies that are submitted for Congressional approval shall be reviewed in the same manner. The Council's comments shall be included when reports on implementation studies are transmitted to the Congress.

Copies of final reports or plans not subject to headquarters review in accordance with the foregoing shall be furnished for information purposes to (a) the heads of other concerned Federal departments or agencies, (b) the Governor of the State(s) in which the project is located, (c) the Water Resources Council, and (d) the Council on Environmental Quality.

Reports or plans requiring congressional approval for project authorization shall be forwarded to the Office of Management and Budget for clearance before transmittal to the Congress. Copies of the reports will be forwarded to the Office of Management and Budget by the responsible department or agency head, together with copies of comments received from the Water Resources Council, other concerned Federal departments or agencies, and States. The responsible agency shall also determine that all statutory requirements have been met and that there is no apparent conflict with other water and land resource projects or programs.

d. *Handbook for Coordination of Implementation Studies and Reports.* The Water Resources Council has prepared and will keep up to date a Handbook for Coordination of Implementation Studies and Reports for the use of agencies represented on the Council and others concerned with implementation studies of water and land resources. The handbook will provide a summary of coordination policies, a description of agency areas of interest and responsibility, designation of agency offices and representatives which are to receive information regarding planning activities, and reports for review.

C. Notification of planning clearinghouse. The designated field office of Federal departments or agencies responsible for federally assisted programs shall inform potential applicants for assistance in planning water and land resource development projects of the need for them to notify the planning and development clearinghouse of the State(s) and the region, or, if applicable, the metropolitan area clearinghouse of their intention to apply for assistance (Bureau of the Budget Circular A–95 and Intergovernmental Cooperation Act of 1968).

Applicants for project assistance are to include with their applications:

1. Comments made by or through clearinghouses, along with a statement that such comments have been considered prior to submission of the application; or

2. A statement that the procedures for informing clearinghouses of an intention to apply have been followed and that no comments have been received.

The responsible field offices of Federal departments or agencies are responsible for establishing working relations with the appropriate clearinghouses. The clearinghouses shall be notified when the agency initiates planning activities and a conference arranged to discuss coordination needs and arrangements. At such conferences, arrangements should be made to obtain available and pertinent base data, statistics, or other information from the clearinghouse. The need and arrangements for further consultation to assure coordination should also be discussed and agreed on.

I. Summary of Proposal

1. *Purpose.* The proposed principles and standards are to be established for planning the use of the water and land resources of the United States to achieve objectives, determined cooperatively, through the coordinated actions of the Federal, State, and local governments; private enterprise and organizations; and individuals.

Plans for the use of the Nation's water and land resources would be directed to improvement of the quality of life through contributions to the objectives of national economic development, environmental quality, and regional development. The regional development objective will be used in formulating alternative plans only when directed.

The beneficial and adverse effects of alternative plans on each of these objectives will be displayed in separate accounts with a fourth account for effects on social factors.

2. *Objectives.* Planning for the use of water and land resources would be conducted to reflect society's preferences for attainment of the objectives defined below:

a. To enhance national economic development by increasing the value of the Nation's output of goods and services and improving national economic efficiency.

b. To enhance the quality of the environment by the management, conservation, preservation, creation, restoration, or improvement of the quality of

certain natural or cultural resources and ecological systems.

c. To enhance regional development through increases in a region's income; increases in employment; distribution of population within and among regions; improvements of the region's economic base and educational, cultural, and recreational opportunities; and enhancement of its environment and other specified components of regional development.

Components of these multiobjectives refer to the types of outputs, environmental conditions, or regional development that are being sought as contributions to the multiobjectives. The term "component need" is used to refer to the type, quantity, and quality of the desired effect now and in the future.

3. *Beneficial and adverse effects.* For each alternative plan there will be a complete display or accounting of relevant beneficial and adverse effects.

Beneficial and adverse effects are measured in monetary terms for the national economic development objective and the regional income component of the regional development objective.

Other beneficial or adverse effects are measured in nonmonetary terms for components of the environmental quality and for the nonincome components of the regional development objective. Estimating these beneficial and adverse effects is undertaken in order to measure the net changes with respect to particular objectives that are generated by alternative plans. For each alternative plan the beneficial and adverse effects on social factors will also be displayed in the system of accounts.

Thus, there are beneficial and adverse effects for national economic development, environmental quality, and regional development objectives, and beneficial and adverse effects on social factors. These would be measured in monetary or quantitative units or qualitative terms appropriate to a particular effect. The multiobjectives are not mutually exclusive with respect to beneficial or adverse effects, and final decisions as to the selection of the recommended plan would be made by considering the differences among alternative plans as to all their effects.

a. National economic development objective. Beneficial effects to the national economic development objective would include all effects on national output regardless of the reason a plan may be formulated. These beneficial effects include the value to users of increased outputs of goods and services and the value of output resulting from external economies. National economic development adverse effects are resources required for a plan and losses in output resulting from external diseconomies.

b. Environmental quality objective. The beneficial and adverse effects of the proposed plan on the environmental characteristics of an area under study or elsewhere in the Nation would be evaluated. Environmental effects will be displayed in terms of relevant physical and ecological criteria or dimensions, including the appropriate qualitative aspects. Such an evaluation would include the effects of the proposed plan on (a) open and green space, wild and scenic rivers, lakes, beaches, shores, mountains and wilderness areas, estuaries, and other areas of natural beauty; (b) archeological, historical, biological, and geological resources and selected ecological systems; (c) the quality of water, land, and air resources; and (d) irreversible commitments of resources to future uses.

Effects under the environmental quality objective are expressed in various quantitative units or in qualitative terms. In some instances, the effects can be expressed in terms of meeting legally established standards.

c. Regional development objective. The beneficial and adverse effects of a proposed plan on relevant planning regions (States, river basins, or communities) would be displayed, including income effects and effects on other components of the regional development objective, including (1) the number and types of jobs resulting from a plan in the region; (2) the effects of the plan on population distribution within the region and among regions; (3) the effects of the plan on the regional economic base and economic stability; (4) the effect of the plan on educational, cultural, and recreational opportunity in the region; and (5) the effect of the plan on environmental quality in the region under consideration.

d. Effects of the plan on social factors. The beneficial and adverse effects of a proposed plan on social factors will be displayed, including the effects of a plan on the real income of classes or groups that are relevant to the evaluation of the plan; effects of the plan on life, health, and safety; effects of the plan on reserve capacities and flexibilities in water resource systems and protection against interruption of the flow of essential goods and services at times of national disaster or critical needs; and effects of a plan on other relevant social factors.

4. *System of accounts.* A system of accounts would be established that displays beneficial and adverse effects of each plan to the multiobjectives and beneficial and adverse effects on social factors and provides a basis for comparing alternative plans. The display of beneficial and adverse effects would be prepared in such manner that the different levels of achievement to each objective could be readily discerned and compared indicating the tradeoffs among alternative plans. The system of accounts will display the beneficial and adverse effects in the region under consideration in relation to other parts of the Nation.

5. *The planning process.* Plans will be directed to improvements in the quality of life by meeting current and projected needs and problems as identified by the desires of people in such a manner that improved contributions are made to society's preferences for national economic development, environmental quality, and regional development. Plans for water and land resources will focus upon the specified components of the multiobjectives desired for the designated region, river basin, State, or local planning setting.

The planning process would include the following major steps:

(1) Specify components of the multiobjectives relevant to the planning setting;

(2) Evaluate resource capabilities and expected economic and environmental conditions without any plan;

(3) Formulate alternative plans to achieve varying levels of contributions to the specified components of the multiobjectives;

(4) Analyze the differences among the alternative plans which reflect different emphases among the specified components of the multiobjectives;

(5) Review and reconsider if necessary the specified components for the planning setting and formulate additional alternative plans as appropriate; and

(6) Select a recommended plan based upon an evaluation of the tradeoffs among the alternative plans.

Essential to this process is the formulation of alternative plans to achieve varying levels of contributions to the multiobjectives and the active participation of all interests.

During the planning process one alternative plan will be formulated in which optimum contributions are made to the national economic development objective. Additionally, during the planning process at least one alternative plan will be formulated which emphasizes the contributions to the environmental quality objective. Other alternative plans reflecting significant tradeoffs among the national economic development and environmental quality objectives may be formulated.

Other alternative plans emphasizing contributions to specified components of the regional development objectives would be formulated only when specifically directed.

Four tests would be applied in the formulation of any given alternative plan:

(1) The acceptability of the alternative plan to the public and compatibility with institutional constraints;

(2) The effectiveness of the alternative plan in meeting component needs of the multiobjectives;

(3) The efficiency of the plan in meeting component needs of the multiobjectives and a demonstration that the plan represents the least-cost means of achieving such component needs; and

(4) The completeness of the plan in accounting for all investments and other required inputs or actions.

As alternative plans are developed and subjected to these tests, the basic steps in the planning process may be reiterated as necessary with each iteration more detailed than the last.

Each alternative plan screened for final consideration should be "justified" in the sense that in the judgment of the planning organization the total beneficial effects to all objectives exceed the total adverse effects to all objectives.

From its analysis of alternative plans the planning organization will select a recommended plan. The plan selected will reflect the importance attached to different objectives and the extent to which different objectives can be achieved by carrying out the plan.

The recommended plan should be formulated so that beneficial and adverse effects toward objectives reflect, to the best of current understanding and knowledge, the priorities and preferences expressed by the public at all levels to be affected by the plan.

In addition to the recommended plan with supporting analysis, other significant alternative plans embodying different priorities among the desired objectives would be presented in the planning report. Included with the presentation of alternative plans would be an analysis of the tradeoffs among them. The tradeoffs would be set forth in explicit terms, including the basis for choosing the recommended plan from among the alternative plans.

6. *Cost allocation and reimbursement.* When necessary to establish reimbursement or cost-sharing policies an allocation of appropriate costs would be made among the objectives and among components of the objectives in such a manner to insure that all objectives and components are treated comparably and receive their fair share of the advantages from a multiobjective plan.

Reimbursement and cost-sharing policies would be directed generally to the end that identifiable beneficiaries bear an equitable share of costs commensurate with benefits received in full cognizance of the multiobjectives. Since existing cost-sharing policies are not entirely consistent with the proposed multiobjective approach to planning water and land resources, these policies will be reviewed and needed changes will be recommended.

7. *The discount rate.* The discount rate will be established in accordance with the following concept: The opportunity cost of all Federal investment activities, including water resource projects, is recognized to be the real rate of return on non-Federal investments. The best approximation to the conceptually correct rate is the average rate of return on private investment in physical assets, including all specific taxes on capital or the earnings of capital and excluding the rate of general inflation, weighted by the proportion of private investment in each major sector. The average rate of return on non-Federal investments is estimated at 10 percent.

Recognizing both the objective of subsidizing water resource projects and the objective of an efficient combination among and between Federal and non-Federal investment activities, the discount rate to be established on approval of the proposed principles and standards is 7 percent for the next 5 years.

8. *National program development.* The Council will formulate a national program for Federal and federally assisted water and land resource activities, including a long-range schedule of priorities among plans for projects, States, regions, and river basins.

9. *Water and land planning activities covered.* The principles and standards would apply to Federal participation with river basin commissions. States, and others in the preparation, formulation, evaluation, review, revision, and transmission to the Congress of plans for States, regions, and river basins; and for planning of Federal and certain federally assisted water and land resource programs and projects as listed in the standards by the Water Resources Council.

II. Evaluation

(Environmental Impact, Unavoidable Adverse Environmental Effects, and Irreversible and Irretrievable Commitments of Resources)

The evaluation system and system of accounts provide for the full and systematic display of effects, including those which are generally regarded as favorable or beneficial, those which are generally regarded as unfavorable or adverse, and those for which preferences differ and may be considered either beneficial or adverse depending upon the value judgments of those expressing the preference. The effects of an alternative plan on the environmental characteristics of an area under study or elsewhere in the Nation would be evaluated for each alternative plan formulated. Thus, environmental effects would be displayed for each alternative plan whether formulated to achieve optimum contributions to the national economic development objective, or formulated to emphasize contributions to the environmental quality objective, or, when specifically directed, formulated to emphasize contributions to specified components of the regional development objective. Environmental effects would also be displayed for alternative plans formulated to reflect various levels of contributions to the national economic development, environmental quality, or regional objectives. The display of environmental effects and the effects on the other multiobjectives for all alternative plans formulated would provide information which should facilitate planning decisions and reduce conflict over such decisions.

The proposed principles and standards conform fully with the intent and the spirit of the National Environmental Policy Act of 1969 by providing for full and systematic evaluation and display of environmental effects for all alternative plans.

III. Formulation

(Alternatives and the Relationship Between Short-Term Uses of the Environment and Enhancement of Long-Term Productivity)

The explicit consideration of the environmental quality objective in formulating plans for the use of the Nation's water and land resources provides opportunity for consideration of significant enhancement of the quality of the environment. Rather than simply displaying environmental impacts the planning process proposed in the Principles and Standards would require that plans be directed to meeting current and projected needs and problems as identified by the desires of people in such a manner that improved contributions are made to society's preferences for national economic development, environmental quality, and regional development. Social impacts are also considered. At the outset and throughout the planning process responsible planning organizations would consult appropriate Federal, regional, State, and local groups to ascertain the components of the multiobjectives that are significantly related to the use and management of the water and land resources in the planning setting. The identification of the specific components of objectives to be considered explicitly in plan formulation will necessarily involve an appraisal of future economic, environmental, and social conditions expected without the plan as compared with those desired by people for the planning area.

The proposed principles and standards would be applied at all levels of planning as defined by the Water Resources Council. At the broadest level of planning, that is, framework studies and assessments, specification of the components of the environmental quality objective would be directed toward the alternative choices that should be considered and evaluated in the study responsive to the needs and aspirations of the people. These alternative choices relate to various views of the desires of people in the mix of objectives to be served in planning for the use of the Nation's water and land resources and reflect the alternative parameters and assumptions upon which the planning is based, including but not necessarily limited to alternative assumptions regarding the levels of future economic and population growth and environmental quality.

At the next more detailed level of planning defined by the Water Resources Council, that is, regional or river basin planning, specifications of the components of the environmental quality objective would generally be concerned with alternative courses of action that should be considered and evaluated in planning for the use of water and land resources of an entire region or river basin as this is the level of consideration of alternative at which the environmental issues and tradeoffs are most likely to be relevant to decisionmaking.

At the most detailed level of planning defined by the Water Resouces Council, that is, implementation studies, specification of the components of the environmental quality objective will generally be concerned with groups of interrelated or individual plan elements where environmental issues and tradeoffs are likely to be significant in the decisionmaking process.

The success of multiobjective planning will depend on meaningful participation of interests concerned with each objective at each step in the planning process.

Under the proposed principles and standards when the objectives of a framework study or assessment or regional or river basin study have been identified the study leader responsible for the management of the study will prepare a statement of the specified components of the multi-objectives and the probable effects of the plan on such objectives. A copy of this statement will be sent to the Water Resources Council and to the Council on Environmental Quality as a preliminary report under section 102(2)(C) of the National Environmental Policy Act of 1969. The study manager will submit completed reports of framework studies and assessments and regional or river basin planning studies to the Water Resources Council for review. Copies of such reports shall be furnished to the Council on Environmental Quality.

It is concluded that promulgation of the proposed Principles and Standards for Planning Water and Land Resources will further the purposes of the National Environmental Policy Act of 1969.

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